Government
Publications

SESSIONAL PAPERS.

VOLUME XV.—PART II.

FOURTH SESSION OF THE FOURTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

Session 1882-3.

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OF THE

Commissioner of Agriculture and Arts

FOR THE

PROVINCE OF ONTARIO,

FOR THE YEAR

1882.

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ANNUAL REPORT

OF THE

COMMISSIONER OF AGRICULTURE AND ARTS,

FOR THE

PROVINCE OF ONTARIO,

FOR THE YEAR 1882.

To the Honourable JOHN BEVERLEY ROBINSON,
Lieutenant Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have again the pleasing duty of congratulating your Honour on the continued prosperity of the Province of Ontario, and of the Dominion generally. The past year has been distinguished for great activity in the various branches of industry; employment both for agricultural and mechanical labour has been in general demand, at advanced rates, and the business of the country seems to have been conducted, on the whole, upon sound commercial principles, which will command confidence in the future.

The agricultural prospects at the opening of spring were not, it is true, of an encouraging character, but atmospheric conditions of a more genial kind eventually followed, and the harvest, as a whole, proved remunerative, notwithstanding prices have ruled somewhat low. Among the many interesting and useful facts and generalizations that have been brought out by the recently formed Bureau of Industries, it is most satisfactory to be assured that the *average* of winter wheat for the whole Province reached 26.3 bushels per acre the past year, a yield that will favourably compare, not only with the best wheat producing areas of the United States, but also with several countries of the old world. It is true that the unfavourable weather, which more or less prevailed during an unusually protracted period of harvest, injured in some districts the quality of the grain, and consequently tended to depress values. But taking all things into consideration, the root and forage crops, the abundant pastures, and the price and freedom from serious disease of live stock, the agricultural interest, the main foundation of our wealth, cannot be otherwise regarded than as healthful and satisfactory.

There is, however, a feature of the history of the past year that cannot be looked upon in so favourable a light,—the intensified excitement which suddenly sprung up in relation to our great North-West, and already as suddenly subsided. A desire to become suddenly rich induced many people, the young and aspiring especially, to become involved in the purchase of wild land, particularly in projected towns and cities, a large number of which will probably never attain a tangible existence. Such as had the good sense to obtain desirable farming land, favourably situated, will, no doubt, succeed by the exercise of industry and perseverance, and do better with much smaller means than in our older settled Provinces. People who are willing to suffer the inconvenience and brave the hardships incidental to the first settling of our Western plains, are richly deserving of whatever success may attend their commendable enterprise.

But the fear that Ontario will become largely depleted of its farming population, and the value of its lands seriously impaired by these means, partakes largely of the chimerical. Ontario will hold her own and continue to advance, as will likely be the case with the other older Provinces. There can be no reasonable ground for misgivings or jealousies if the subject is given a thorough and patriotic consideration; for, however rapidly the immense agricultural resources of our great North-West may become developed, the result would be found beneficial to the Dominion of Canada, and especially to Ontario, by enlarging the boundaries of commerce and increasing the demands for manufactures.

Agricultural Societies.

The number of these societies in connection with my Department has not of late materially varied. The tabulated statements in Appendix A comprise the various items of receipts and expenditure for the past year, from which it may be fairly inferred that these numerous organizations, on the whole, are progressively advancing. Of course the rate of progress cannot be uniform, as the societies are variously affected year by year by the character of the season, the value of the crops, including live stock, and also, in no small measure, by the state of the weather at the time of holding the annual exhibitions.

In estimating the value of Agricultural Societies, and the benefits they confer upon the country, it should be carefully borne in mind that they cannot be measured merely by the number of their members, nor even by the quantity of the exhibits, or the attendance of visitors at the yearly exhibitions. The best test is to be found, not so much in the mere amount of the exhibits as in their *quality* and adaptation to the requirements and markets of the country. The improvements that have been made of late years in live stock, cereals and fruits, and also in implements and labour-saving machines are truly remarkable, and much of the realization of these results is due to the competition which Agricultural Shows induce, with the excellent opportunities such gatherings offer to farmers, mechanics and others for comparing notes and making personal investigations, and of forming correct habits of observation.

It is sometimes said that there are too many Agricultural Societies and Shows, and that as the latter are held in the fall, at or near the same time, they are liable to interfere with each other's operations, and that too much time and expense have to be incurred in attending many of them. There is, doubtless, some truth in these objections, but the

grounds on which they are based are happily diminishing. An increasing tendency is being manifested, not only by township societies, but also by those of counties, for holding union exhibitions, and hence large central shows have sprung up in various sections of the Province, which, for magnitude and superior excellence of the exhibits, have elicited the admiration of crowds of visitors. In the older and better settled districts, where railways and improved roads exist, this onward tendency will continue; but in remoter sections, with a sparse population, Agricultural Societies will have, for some time to come, to content themselves with exhibitions of a more humble and contracted character.

It is surely something that in the large areas of country which we possess, where the people are only emerging from a primitive forest life, to have an opportunity once a year of meeting together for mutual encouragement, and of viewing, with their wives and children, a display, however small, of the best animals and productions of their section, the largest they have been able to make. The day of small things should not be despised, as the history of the early settlements of this Province shows how, in a comparatively few years, great changes have been produced, and that it is wise and patriotic to afford what aid and encouragement can be given to such as are labouring to gain from the primeval forest productive farms and comfortable homes. With this view a larger amount of the Legislative grant, for the encouragement of agriculture, has been made this present session to outlying districts.

Agricultural and Arts Association.

I have much satisfaction in calling attention to the Report of this old association (Appendix B), which clearly shows a marked advancement under the revised management, with an encouraging prospect in the future.

The Council have acted wisely, after the experience of last year, in continuing the prizes for the Best Managed Farms in given districts. By pursuing this system annually the whole of the Province will be ultimately reached, and a large body of information obtained relating to agriculture and farm management that cannot fail of being exceedingly interesting and of much practical utility. In this way our farmers will obtain useful material, which will be often suggestive of improvements, and immigrants furnished with reliable facts that will help them materially to make judicious selections.

The Council may also be congratulated on another new departure in offering to competition subjects for prize essays in relation to rural economy, with a view of enlisting not only our experienced farmers and others taking a deep interest in the questions, but also young men practically engaged in farming. The prize essays which appeared in the Report for 1881 attracted much attention, as it is believed will those on Manures and the Homestead of the succeeding year. There can be no doubt that a knowledge of the composition and management of manures is of the most vital importanee to agriculturists; while very much remains to be done, even in our oldest and best settled districts, in the manner of arranging the homestead in all its departments, to secure the largest amount of comfort, economy and picturesque expression.

The 37th Annual Exhibition of the Association was held in the City of Kingston, from the 18th to the 23rd of September last; the amount of exhibits reached an average, and in *quality* live stock especially was scarcely ever equalled. The Dominion Govern-

ment having made a liberal grant for imparting to the Show a Dominion character, there was a number of exhibits from the Province of Quebec, and some from the Maritime Provinces; and the display of cereals, roots, etc., from Manitoba, was exceedingly creditable to that rising Province, indicating agricultural resources of the highest order.

The incessant rain during the greater part of the Exhibition was a very unfortunate circumstance, not only as regards the diminution of receipts for admission, but also rendering the management and inspection of the Show very unpleasant and unsatisfactory.

A new and what must be considered an important feature connected with the Exhibition, that should be mentioned, was the inspection of the Cattle and Sheep Departments by Professor Brown, of the Ontario Agricultural College, whose elaborate report will be read with avidity by all interested in the live stock of the farm. The report contains some new and much interesting matter relating to the history and breeding of cattle and sheep in this Province, and will serve as a useful reference. If similar reports were made by competent hands on horses, grains, fruits, machines, implements and manufactures, it would greatly enhance the interest and value of our Provincial Exhibitions.

The Council having been under the amended Act reduced to thirteen members, elected by the Agricultural Societies of the Province, the expense of management has been greatly reduced, without, at least, as facts show, impairing the efficiency of the Association. The Shorthorn Herd Book is now being promptly brought out, and the Stock Registers continued, and there is good ground to hope that with the energy and devotedness of the Council, and the efficient services rendered by their zealous Secretary, the old "Provincial Association" will do in future even more than what all willingly acknowledge it has accomplished in the past, in advancing the agricultural and cognate interests of this great Province.

Ontario Veterinary College.

This Institution has made steady and healthy progress from its commencement, and for the last two or three sessions the number of students has greatly increased, there being now on the rolls 130. These come from different parts of Ontario, and a considerable number from our eastern Provinces and various parts of the United States.

The College has now reached a high position; it is certainly unequalled on this continent, and only surpassed by few in the old world. Principal Smith and his efficient staff of teachers have just cause to feel proud of the great success which has attended their labours.

The weekly meetings of the students for reading papers and the discussion of subjects pertaining to the veterinary profession have continued to be numerously attended, and the students have been reported as evincing a degree of intelligence and earnest perseverance, which, if afterwards carried out into practice, can hardly fail of success.

The Fruit Growers' Association.

The report for the past year (Appendix C) possesses more than its usual amount of interest, since the sphere of the Society's operations have become extended. For several years it laboured with much success in promoting the interests of Fruit Culture, and,

without diminishing its wonted ardour in that most important field, the general principles and practices of Horticulture, with those of Forestry, including ornamental planting, have been added, and with what success the accompanying report clearly indicates.

The American Forestry Congress was held in April, 1882, in Cincinnati, and in the following August in the City of Montreal, Province of Quebec, with a view of extending an interest in a more enlightened and economical management of this great source of national wealth. It was deemed expedient to send a deputation of gentlemen belonging to the Ontario Fruit Growers' Association, which now comprises Forestry as among its principal objects, to both these meetings, and the elaborate appendix to the Report affords very gratifying evidence of the successful manner in which they discharged their duties.

The rapidity with which the diminution of our forests is going on, apart from legitimate commercial demand, such as the frequent recurring ravages of fires, and the too often unnecessarily occurring waste in management, it is certainly high time that all available means should be promptly employed to mitigate, at least, these destructive evils, though we may not be able wholly to prevent them. The summary with which the Delegates conclude their valuable report, as indeed the report itself, should receive a most careful consideration by our legislators, and of all who have at heart the best interests of the country.

There will be found scattered through the Report a variety of useful information relating to the management of garden crops, and the different kinds of fruits cultivated in this climate, that will be of great general utility, and especially to young beginners engaged in such operations; while even most experienced horticulturists cannot fail in gleaning something that will aid them in making further advances.

The free annual distribution among the members of new or improved varieties of fruit trees is still continued, and the results of this practice, it is believed, have been very beneficial. We are now beginning to ascertain the kinds of fruits best adapted to the varying climates and soils of the Province with a degree of certainty unknown till the Association commenced its labours in this important direction; and, as a consequence, an impulse has been given to fruit culture in all directions that has already been attended by gratifying results, with the encouraging prospect of yet greater achievements in future.

The *Canadian Horticulturist*, an illustrated monthly journal, ably conducted by the indefatigable Secretary of the Society, is also freely presented to the members. In this way much valuable and seasonable information is periodically supplied relating to horticulture and forestry specially adapted to the requirements of our people.

A small committee was appointed from the Directors of the Association two years ago to assist the Professor of Horticulture and the Gardener of the Agricultural College in laying out the gardens, conservatories, and ornamental grounds of that institution, and also to test various trees and shrubs for economic forest-planting, shade and shelter, and general adornment. The rate of progress already made is very satisfactory, and will be perused with much interest in the report of that department for the past year.

Entomological Society.

It will be seen, by referring to Appendix D, that the Society continues quietly to pursue its path of usefulness.

The annual meeting for the past year was held in the City of Montreal during the session of the American Association for the advancement of science, as it had been correctly anticipated that several distinguished scientists from the United States would be induced to attend, and contribute to the interest of the proceedings. Although the Society is mainly supported by the Ontario Legislature, it has had for several years a flourishing branch at Montreal, which has contributed much valuable assistance in diffusing practical information on the science of entomology, particularly adapted to the wants of both agriculturists and horticulturists.

The past year has fortunately not been distinguished by serious insect depredations on either farm or garden crops. In some localities, however, the Hessian fly made its appearance and did some damage to wheat. The army-worm, clover-seed midge, and what some think to be a new disease affecting peas, though probably of insect origin, were found in some places, and attracted the attention of farmers. Suitable information regarding the nature of these pests, and the means of arresting or preventing them, with others that affect the orchard and garden, will be found scattered throughout the Report.

The *Canadian Entomologist* continues to be published monthly by the Society, and receives increasing attention from the cultivators of this interesting and useful science, not only in the Dominion of Canada, but also in Europe and America.

With a view of making the large amount of useful matter contained in the Society's reports more readily and generally available, preparations are being made for the publication of a copious and systematic index of the whole from the commencement to the year 1882, inclusive. The value of such an index will be understood and appreciated by not only the students of entomology as a science, but also by those, whose number is ever increasing, who are seeking for information in relation to its important applications to the practical purposes of life.

The Society having been requested by the Minister of Marine and Fisheries of the Dominion to furnish specimens illustrating the natural history of insects serving as food for fishes, or as the destroyers of spawn, for displaying them at the approaching International Fisheries Exhibition to be held in London, England, some forty cases are in the course of preparation for that purpose.

Agricultural College and Experimental Farm..

The report of this important institution (Appendix E) affords satisfactory evidence of the efficient manner in which its energetic President and able staff of teachers have discharged their onerous duties during the past year. From an insignificant beginning, and beset with serious difficulties, the Farmers' College has been gradually making healthy progress, and it has now reached a position, with every sign of being able not only to maintain but also to advance, which few indeed could have anticipated half a dozen years ago. Whether we look to the great increase of students, the extension of the curriculum, the enlargement of the College buildings, or the improvement of the farm

as a means of imparting a sound and extensive knowledge of the theory and practice of Agriculture, specially adapted to the requirements of this Province and Dominion, it must now be acknowledged that the enterprise has become a decided success.

As the report is constructed in a systematic manner and replete in details, a careful perusal of its contents will give a clear and comprehensive idea of the working and present conditions of the College in all its departments. It will be seen that a youth of ordinary ability and education, and exercising proper diligence, may in two sessions acquire an amount of knowledge that will enable him, with prudence and industry, to commence and pursue the practice of agriculture as a business, with a well-grounded hope of success.

The contributions of Professor Brown, giving the results of experiments with live stock, cereals and manures, will be found, as in former reports, exceedingly interesting and suggestive. Investigations of this character tend by degrees to correct errors in regard to farm-management, and help to explain many obscure and doubtful points which come under the every-day observation of the agriculturist. It is true that experiments of this nature involve considerable time and expense in thoroughly carrying them out, and it cannot be expected that farmers in general can undertake them with any prospect of success. This can only be done in a new country by a public institution like the Agricultural College with its Experimental Farm, under a staff of efficient instructors, who have sufficient means and time at their disposal for fully carrying out such objects. In this way experimental agriculture may be made to contribute largely to the wealth of the country. The reports of the Professors of Chemistry, Biology, etc., with that of fruit and forest planting, by a Committee appointed from the Directors of the Fruit Growers' Association, will well repay a careful perusal.

I must not conclude even what is little more than an allusion to this institution without referring to the large additions recently made to the library and museum, aided by my esteemed colleague, the Minister of Public Instruction.

The College Library at present has upwards of four thousand volumes, comprising works of reference, science, and general literature, to which the students have free access —a source of instruction and healthy mental recreation, the benefits of which can hardly be over-estimated. The museum has just received from the Department of Education a most valuable addition of upwards of five thousand duplicate specimens of natural history objects, collected from various parts of the world, and for which Dr. May has prepared a copious catalogue, scientifically arranged, but popular in its character. There are probably few agricultural colleges, either in the new world or the old, that have secured in so short a time a library and museum of equal magnitude and value. What is now wanting to make the College fully able to meet the pressing demands of this advancing age, is an adequate chemical and physical laboratory, both for the purposes of class teaching and the prosecution of original research.

Bureau of Industries.

The Bureau of Industries was organized in the early part of last year, its object being to collect, tabulate and publish industrial information for public purposes. The

extent and character of the work of this Bureau will be seen by reference to the first Annual Report of the Secretary (Appendix F). The information it contains relates chiefly to agriculture, manufactures and population. The agricultural returns have been obtained from the farmers of the Province and a staff of special correspondents; the manufacturing statistics from manufacturers themselves, and the population from the reports of municipal officers. Statistics of the areas of crops, the numbers of live stock and the values of farm property were collected with the assistance of the teachers of the Province, the school section being taken as the unit of enumeration. The condition of crops and live stock was reported to the Bureau from time to time during the growing season, and the produce of crops was based on the averages computed from returns of actual yield furnished by threshers and correspondents. The greater part of this information was given to the public through the medium of Special reports, recording the progress, prospects and results of farm operations for the Province. There are two or three features of the agricultural statistics that deserve special notice. The acreage and production of field crops enable us to compare the agricultural capabilities of the Province with those of other countries. This comparison is highly satisfactory, for it shows that Ontario holds an unrivalled place among the States and Provinces of the continent. The census returns for 1871 and 1881 give the average of wheat, potatoes and hay only; so that with these it was possible at best to make partial comparisons. Besides, no comparison could be made of the productiveness of the spring and fall varieties of wheat—a matter that is of no slight importance to farmers. The classification of live stock is another interesting feature of those statistics, especially in relation to improved breeds. The fact that there are upwards of 23,000 thoroughbred cattle in the Province, of which two-thirds are Shorthorns, has a good deal of significance. Where there are so many pure-bred animals, it is certain that there must be a large number of grades. It is ascertained, too, that by improving the breeds of sheep the average weight of fleeces has been more than doubled within the period of forty years. The statistics of cheese factories and manufactures, although incomplete, furnish good evidence of the extent and importance of these interests. The cheese industry has been developed in Ontario almost wholly within the past twenty years, and the extent which it has attained is shown by the fact that the value of the annual product is now not less than $4,000,000. I am hopeful that within the next twenty years, and under the creamery sytem, an equally good exhibit will be made of the butter industry of the Province. It is a matter of regret that more complete returns of manufactures were not received, as there is no doubt that they would make a very large showing. They would be valuable in many respects, but especially for purposes of comparison with similar industries elsewhere, and for indicating the growth and progress of the country. Take, for example, the manufacture of agricultural implements. There are said to be 122 establishments in the Province, and of these, 44 have made returns to the Bureau. A comparison with the census returns of the same industry for 1870 shows that a great expansion has taken place; it is evidence of a large measure of prosperity in agriculture, as well as in this line of manufactures. In the following table, comparison is made with the leading States of the American Union and

with the entire Union—the American figures for agricultural implements being taken from the census of 1880:

——	Establishments.	Capital.	Hands.	Wages.	Materials.	Products.	Average Wages.	Per cent. of Materials in Products.	Value of Net Product per Hand.
		$		$	$	$	$		$
Illinois	220	11,306,955	7,200	3,186,999	6,722,930	13,498,575	442	50	941
Indiana	96	3,231,818	2,471	1,010,644	2,182,137	4,460,408	409	49	922
Michigan	143	2,458,287	2,004	650,192	1,337,945	3,102,638	324	43	880
New York	265	9,580,009	6,462	2,513,875	4,580,010	10,707,766	389	43	948
Ohio	156	16,111,576	7,536	2,981,065	7,243,326	15,479,825	395	47	1,093
Ontario	44	3,203,890	2,397	954,586	1,340,897	3,833,018	398	35	1,040
Pennsylvania	220	3,452,923	2,617	898,608	1,788,420	3,686,212	343	49	725
United States	1,943	62,109,668	39,580	15,359,610	31,531,170	68,640,486	388	46	937

The six States whose statistics are quoted above manufacture 75 per cent. of the agricultural implements of the Union; and it may, therefore, be taken as a matter of course that each of them has a large market outside its own limits. Ontario manufacturers, on the other hand, depend almost exclusively on the home market. The high customs duty excludes their products from the United States; while high rates of freight to Manitoba are a hindrance to the supply of that market, hitherto necessarily circumscribed by the sparseness of population. Under these circumstances, it is obvious that the manufacture of agricultural implements in Ontario must be regarded as a very important industry, especially if it be assumed that the 44 establishments giving returns fairly represent the whole number in the Province.

It will be noticed that the percentage of raw materials in manufactured products is considerably lower in Ontario than in the United States,—compared with the whole Union, it is a difference of $11 on each $100 in favour of the Province. The State of Ohio alone shows a larger value of net products per hand employed; but if the capital invested is taken into account Ohio suffers largely in the comparison. Thus it appears that Ontario manufacturers of agricultural implements possess three solid advantages over Americans in the same department of industry,—(1) in the value of raw material; (2) in the productive results of labour, and (3) in the amount of capital required to carry on business. These important facts make plain the cause of the greater cheapness of farm implements in Ontario than in the United States, as well as of the substantial prosperity of the manufacturers themselves. It is gratifying to know that the varied industries of the Province are undergoing rapid development, and the record of progress as furnished from year to year by the Bureau cannot fail to be the means of attracting a large measure of attention. I feel confident that, in all the great industrial pursuits, no

other part of America offers a better field than Ontario for the profitable employment of capital and labour. Its climate and soil are in an eminent degree favourable to successful enterprise; and with railways traversing every county and reaching every business centre, with great waterways on every side, with richly wooded forests and the useful metals in abundant store, the conditions of industrial prosperity in the workshop as well as on the farm are well assured.

Poultry Association.

It will be seen from the Report of this Society (Appendix G), that the Annual Show held at Brantford, in February last, was very successful; the number of exhibits being considerably larger than on any previous occasion, and the quality of the birds of a superior character. The entries amounted to 1,192, and the sales effected reached at least $4,000.

The improvements made of late years in the breeding and management of poultry have been very marked; a result to which the operations of the Association have doubtless in no small measure contributed. The export of poultry and eggs has of late received more attention, with encouraging prospects in the future. During the year 1881 there was shipped from the Province, chiefly to the United States, 5,729,847 dozens of eggs alone, valued at $696,544. I trust that the next Annual Report of the Society will still indicate a healthy progress, and that the Directors will give fuller information regarding the breeding and management of poultry in general, adapted to the climate and other physical conditions of the Province and the special wants of our people.

Dairymen's Associations.

The Reports of the Eastern and Western Dairymen's Associations for the past year (separately published) clearly indicate that the manufacture of cheese on the "factory system" continues to increase, and that the business is remunerative. Our cheese has now attained to an excellence in quality which places it on a level with the best brands of American production; a ready demand is found for it in Britain, and an increasing taste for cheese as an article of daily food is being experienced by our own people.

With a view of effecting a similar improvement in the manufacture of butter to what has been accomplished in cheese, an Act has just been passed by the Legislature for establishing public creameries, for the purpose of affording instruction, free of charge, in the art of butter making, brought down to the present advanced state of knowledge. It is proposed to establish at first a creamery in each of three great divisions of the Province, East, Central, and West, in which the most approved plans for making butter will be practically taught, and the modern appliances carefully tested. It is hoped that young people especially will thus become induced to embrace the opportunities offered, of making themselves well acquainted with the principles and practice of this important art, so that our production of butter may be largely increased and its *quality* specially improved, and consequently its pecuniary value, whether for domestic or export purposes, proportionately increased. By the carrying out of these means energetically it is hoped that the objections which have so long been made to the acknowledged inferiority of much of Canadian butter will, by degrees, be at length wholly removed. Some interesting

statistical information on the Dairy interest of Ontario will be found in the Report of the Bureau of Industries for the past year.

Tree-Planting.

I may also be allowed to express gratification in the passing, during this Session, of an Act, for the encouragement of the planting and growing of trees for ornamental and economic purposes; an object of high importance, as conducive to the beauty and productiveness of the country, and also to the health and comfort of the people. It is greatly to be desired that the public, especially the owners and occupiers of land and houses, will unite and do their utmost to make the measure a success.

Respectfully submitted,

S. C. Wood,

Commissioner of Agriculture.

Toronto, January, 1883.

APPENDIX TO REPORT

OF THE

Commissioner of Agriculture and Arts.

APPENDIX (A).

ANALYSIS OF REPORTS OF AGRICULTURAL AND HORTICULTURAL SOCIETIES FOR 1881.

ANALYSIS OF REPORTS

OF

Agricultural and Horticultural Societies

FOR THE YEAR 1881.*

BRANT, NORTH.

The President and Directors of the North Brant Agricultural Society beg leave to present their Annual Report for the past year.

We are sorry to have to say that the financial statement does not show as large a balance in the Treasurer's hands as at the last Report, but that is owing to the grant of $200 made by the County Council not being received yet, as they neglected to order the payment of it at their last meeting.

A Spring Exhibition of horses and cattle was held on the 7th of April, which was well attended.

The show of heavy draught horses was very fine, but in blood horses there was no competition.

A special premium of $20 was subscribed by the citizens of Paris, and offered for the best general purpose horse, which was well competed for.

The Annual Exhibition was held on the 4th and 5th of October, and was quite a success in every way.

The show of horses was very large, and we might confidently say the finest ever seen in the county; the number of entries in this class being 111 more than those of last year.

The show of cattle, sheep, pigs and poultry was also very fine.

Carriages and implements were well represented.

The hall was well filled; but, owing to the unfavourable season, the display of fruits, roots and vegetables was not so large as last year, and consequently reduced the number of entries, as in fruit alone the number was 242 less than those of last year. . . .

The entries of stock and produce may be enumerated as follows, viz.:—Horses, 329; cattle, 131; sheep, 156; pigs, 69; poultry, 212; grain, 66; dairy, 56; roots and vegetables, 119; fruits, 183; carriages and implements, 68; ladies' work, 195; mechanical work, 24; extras, 42—in all 1823, being 213 less than those of the preceding year.

Attention has to be called again to the matter of procuring grounds for the use of the Society, as nothing has been accomplished in that direction in the past year by the Committee appointed at last Annual Meeting, and by a notice given by the agent of the

* The names of Electoral District Societies are arranged alphabetically and printed in capitals, with their respective Township and Horticultural Societies in italics. Condensed financial statements will be found at the end of this Appendix.

Capron estate possession of the grounds now used has to be given up at the expiration of the present lease, namely, 1st of April next. We now leave the matter in your hands to say what is the best to be done, so that the new Board may have some idea of what is the wish of the members.

Onondaga.

We have to state that it was with difficulty we were able to secure the support necessary to carry on the Society, owing to a lack of interest which, we fancy in almost all cases, is noticeable in the early part of the year, especially in the case of small societies such as ours. However, we did the best we could, and secured sixty-nine of a membership in all. The amount raised from all sources was $262.31, and was sufficient to pay off all prizes granted, and all expenses incurred, leaving a small balance on hand.

The day of our exhibition opened with rain, and this militated very much against the success of our show, still, although appearances indicated failure, on the whole it turned out fairly well. We submit herewith our financial statement, by which it will be seen that due economy has been exercised by your Board.

BROCKVILLE, E. D.

Your Directors, in presenting this their Twenty-seventh Annual Report, are pleased to be able to still congratulate the membership on the steady progress made by the Society during the year just past.

At the last Annual Meeting a resolution was passed, almost unanimously, to hold the fair for three instead of two days as formerly. Quite a number of our members, and some of the Directors were afraid that the proposed change would be detrimental to the Society, and although the matter was discussed at the first meeting of the Board still the prevailing opinion was that they would try the experiment for one year. Another important change was the raising of the fees at the gate from 10 to 15 cents. This, if anything, raised more opposition than the change in the number of days. Opinions were freely expressed that the fair of 1881 would be a failure. What is the result? The fair, despite the fearfully dry weather of the months of August and September, was in many departments superior to anything ever before held. The show of ladies' work was not as large as formerly, but the articles exhibited were nearly all new, which shows that a better class of fancy work is being manufactured, and that the old articles have had to yield to the march of improvement, and were not considered worthy of a place in the buildings. We think that with the exception above noticed, and a slight falling off in exhibits of butter and cheese, that the halls were as well filled as formerly, while on the outside the show was really magnificent. The Directors caused to be re-erected at a small cost a rustic arbor, devoted especially to the exhibition of house plants and flowers, by special arrangement between the Secretary and Treasurer and R. B. Heather, one of the finest displays of horticultural productions was made that has ever been witnessed at any fair in Central Canada. This feature alone of the exhibition was well worth the price of admission. The long rows of cattle stalls were filled with splendid animals; and while we do not wish to particularize, we cannot refrain from mentioning the splendid herds of grade cows shown by Messrs Arnold, Stowell and Gardner for the special offered by the Hon. C. F. Fraser. Sheep and swine were well represented, and some really fine animals were shown. We could not help contrasting the stock of our last exhibition with that exhibited at our first annual fair held at Unionville; and, with all due courtesy to the exhibitors of 1875, we must say that the change is so marked that we are led to ask, What has caused the remarkable change in the appearance of the stock in the few short years that have intervened? We unhesitatingly assert that the change has been brought about by the keen competition and friendly rivalry that has existed among the farmers of our Electoral District. The show of horses was good, and while the spreading out of the different classes, so as to give an opportunity for better showing them to advantage, was

the means of dividing the interest of the spectators over a longer period, still the crowd around the horse ring was always large, and we venture the assertion, without fear of successful contradiction, that a finer lot of horses than was exhibited in the ring, at the close of the exhibition, could not be found in one quarter of the show grounds in Ontario. The show of machinery was good; and while there were few articles possessing any new points of excellence, the exhibit was made up of first-class articles.

Taking the whole year's operations into consideration, we candidly think that the two changes referred to, at the commencement of this Report, have worked for the very best interests of the Society, for one year ago to day we were over $200 in debt, to-day our indebtedness is all paid, and we have a handsome sum in our Treasurer's hands.

DUNDAS.

The Directors beg leave to submit, through their Secretary, a statement of the financial condition of the Society, and they congratulate the members on the prosperous condition in which the Society now stands—the receipts being in excess of those for some years past. The Directors find, that after paying a largely increased premium list, there still stands in the Treasurer's hands a balance of $282.31 to the credit of the Society, and they hope by a proper exertion on their part, by creating a greater interest in the Society on the part of the agriculturists, mechanics and others, to make this Society what it should be—one of the first in the Province.

The Annual Exhibition in September last was an improvement both in attendance, as shown by the receipts for admission, and in the show of stock and other exhibits. The show in horses was very good. The samples of grain were of more than average quality generally, though the samples of barley were not as bright as in former years.

The Directors feel that they would be wanting, in closing their official year, did they not express their thankfulness to a kind Providence for the many blessings of peace and prosperity enjoyed.

DURHAM, EAST.

The Township of Cavan amalgamated their funds with the Electoral District Society, as provided by Statute, for exhibition purposes, and held their united Show at Millbrook, on the 13th and 14th of October. The Exhibition does not call for any special remark, having presented nothing new, but was of the ordinary kind. We think it was hardly up to the standard of former years. The Exhibitions in this Riding are not as good as they were twenty years ago. Quite a number who formerly exhibited well-bred stock have retired, and the rising generation do not seem to take the same interest in the breeding and exhibiting of stock as their fathers did, except in horses, which are very much improved during the last years, especially the agricultural class and heavy draught. Notwithstanding the falling off in the exhibitions, the general stock throughout the county is far superior to what it was in former years. Farmers are beginning to realize the advantage of raising stock to meet the export demand. Although we have a Central Association in this district which holds its exhibitions at Port Hope, Cobourg, Peterbro' and Lindsay alternately, the County and Township Societies still hold their shows much the same as previous to this association being formed. It is the opinion of a great number of farmers that we have too many shows, and yet we suppose they will not be discontinued without some legislative enactment providing for the same. The almost total failure of the turnip crop in this district will materially lessen the production of beef and mutton, as there does not seem to be any substitute for this valuable root. Farmers are not inclined to feed coarse grain to stock at present prices. Corn is not grown in sufficient quantities for the production of beef and pork. It seems a very uncertain crop about here. The Colorado Potato Beetle was very destructive last

year—this, added to the dry weather in August, caused the partial failure of the crop. The grain crop was generally good. Peas in some instances failed more or less. This crop has been affected considerably during the past few years by the bug, and it threatens to become still more destructive. Since the failure of the wheat crop farmers have resorted to growing peas, which has been quite profitable, but if this pest increases it will lessen the production very much. The fruit crop has suffered very much from its numerous enemies. The ingenuity of fruit growers will be severely taxed to save it from destruction. The migration from this Section to the great North-West is still going on. People are leaving in great numbers. A great number of labourers' cottages are empty, and unless the places of those leaving are filled by emigrants there will not be sufficient men to till the ground. Wages will be very high the coming season. We do not hear of any farms being left vacant. There seems to be a great desire on the part of labouring men to become tenant farmers. There will be a great scarcity of domestic servants. We think the governments, both Dominion and Provincial, should make a great effort to secure emigration.

WEST DURHAM.

Clarke.

The Exhibition held this year, as to the number of entries, was little short of last, and would have been equal to it, if not greater, had it not been for the unseasonable weather.

In Class A, horses, 96 entries were made. The animals exhibited were very superior, and would compare favourably with any in the Dominion, some of the exhibitors having carried off prizes at the Provincial in London and the Industrial Exhibiton at Toronto, at both of which fancy prices were offered, and in most cases refused. The carriage or roadster seems to be in more favour than the purely agricultural and Clydesdale, the latter is fast giving place to a more useful animal, suitable either for the plough or on the road.

The pure blood animal for which our township was famed a few years ago, in consequence of being the birthplace of "Newcastle Maid," "Pilot," and some others which became such favourites on the race course, are not now receiving the same attention, although some of the same stock will be heard from at the Newcastle winter races as carrying off prizes.

A new feature in the last Exhibition was granting a special prize for the best walking horse, which after a keen competition was awarded to Mr. William Cullis.

In cattle, 50 entries were made—the Durham having the preponderance, although it has been conceded that they are more valuable for fattening than for their milk giving properties. It has been a matter of consideration with your Directors whether more encouragement should not be extended to the importation of Ayrshire, Hereford, Jersey, Guernsey and other favoured stock, their milk giving properties being now so fully recognised and established. Owing to the great change which has taken place in the older settlements of Ontario, agriculturists are devoting their attention more to stock raising for export, the establishing of cheese factories, and more recently the erection of creameries. This latter industry is likely to produce a complete revolution in the quality of an article which has for some time past been looked upon abroad, especially in the English market, with disfavour, the quality having been pronounced as unmarketable—more fit for grease than the table. The cause is easily accounted for: butter is taken into the stores at all seasons of the year, of all qualities, and thrown into a mess, which may in a few days, at the option of the purchaser, be again worked over, put into packages, sometimes in a half putrid state from bad cellarage and other causes, then shipped off as Canadian butter. The few creameries already established have retrieved in part the bad name, the butter made in them commanding from five to ten cents per pound more. In this township none have yet been established, but it is the province of

agricultural societies to foster and encourage in every way this class of industries, as it is now clearly established and borne out by experience that the soil in the older settlements has become impoverished from growing wheat crops in succession, and has lost much of its wheat growing properties. It can only be reclaimed to its virgin state by imparting thereto a new mode of culture, based upon scientific principles, or allowing it to rest, and turning attention more to the raising of stock, and the more profitable and less expensive industry in the erection of cheese factories and creameries. The latter industry is rapidly developing itself throughout the Province.

In sheep, 42 entries were made. The reputation of our breeders has lost none of the prestige enjoyed by the township for the last quarter of a century, noted as it continues to be of possessing the purest and best blooded Leicester sheep in Canada. A few of our prominent breeders have exhibited at the Provincial and Toronto Exhibitions, carrying off prizes, and selling some of their animals at remunerative prices, retaining sufficient of their stock to keep the control of the market in this favourite breed. Others of our popular breeders still adhere to the Cotswold, which to them has been a source of profit, the demand for which from the United States has been on the increase. From information obtained their object being to obtain a cross between their native breed, for the purpose of meeting the existing demand for finer wool. This demand has extended to our own Province, and induced your Directors to insert in the prize list prizes for medium-woolled sheep, or what is more popularly known as "Down," believing that under the existing tariff this description of wool will find a good and profitable home market, and command from 30 to 50 per cent. more than ordinary wools.

In swine, 22 entries were made, the animals shown being very fine. This class does not receive so much attention as in past years, our farmers as a rule raising only sufficient for their own and home consumption; the higher prices now obtained for peas and other coarser grains not enabling them to compete with the corn growing States of the West.

In poultry we have many bird fanciers, especially among our younger agriculturists, who while taking this up as a pastime are, at the same time, carrying out and developing another industry just merging into life. Who can foretell what the future may be? We find that within the last twenty years, when turkeys, geese and fowl found their way to the English shores by the dozen, it is now no uncommon occurrence to find them shipped by the car load.

The export of eggs has also become an important factor in the commerce of Ontario. A highly remunerative market is found for our surplus in the United States, and extensive shipments have been made to Great Britain.

In the class of poultry 64 entries were made, many of the birds were well worthy of commendation.

We come now to the class of grain seeds. Your Directors regret that there is a falling off in the number of entries as well as in the quality of samples exhibited in this class. In fall wheat, which has again been introduced and tried to some extent throughout the township, the crop was not found very satisfactory, and the samples very ordinary. They could not be classified as of first quality. Spring wheat cannot be said as being up to expectations. While a few of our farmers have been favoured with a good yield, the majority are far from being recompensed; some, with laudable zeal, have been trying new kinds under different and high sounding pedigrees, the bulk of which might be traced to the same origin. None of those introduced have been found equal in strength for manufacturing purposes to the hardy Minnesota. So much has this proved to our disadvantage, that in making contracts for strong bakers' flour, our millers have reluctantly been compelled to forego entering into them, and for some time past feel content to allow their mills to stand comparatively idle rather than run at a loss. The bonding system of grinding American wheat has proved to be a monoply in the hands of a few extensive millers, whose property is placed on the navigable highways of the Dominion, and much to the disadvantage of our local millers.

There are, however, two exceptions which it is proper to note under the head of grain and seeds, namely—peas and barley. In the former, some part of Ontario have been highly favoured, and this township peculiarly so. The acreage under peas was

unusually large, and the crop above an average. The prices realized have also been highly satisfactory, and if that dreaded pest—the pea bug—does not extend its ravages in a greater degree than is at present shown, we anticipate a greater area being sown during 1882.

Barley, as is well known, has become the staple crop of the township. The area sown in 1881 was at least 50 per cent. more than in 1880; the yield was proportionably greater. The prices obtained were highly remunerative; in truth, all that the heart of man could desire, unless that heart is wedded to the earth, and become hardened like the clods of the valley, taking its growth and nourishment therefrom, instead of looking up to the bounteous Benefactor, the giver of all good, and from whom all blessings flow.

In referring to fruit—a class which may be enumerated among the luxuries of life—although the township may not be so highly favoured as in the past year as to the yield, there has, notwithstanding, been a considerable export. The number of entries giving no indication of a falling off in crop, there being 120 entries as against 200 in 1880; the quality shown being excellent, and pronounced superior to any exhibited at the West Riding or Port Hope Central Shows.

In flowers and plants, the dry season had much to do with the meagreness of the display. It has been conceded that midsummer is considered the most suitable for exhibiting articles in this class. It is a matter for consideration whether it is not advisable to amalgamate with the Horticultural Society established in Newcastle, with a membership of about 60, merging their funds with the township's, and allowing both Societies to compete at all Exhibitions held. Such action would prove a source of strength to both, and is worthy the consideration of your Directors to carry out, if deemed advisable.

In Class I—vegetables—the articles shown cannot compare with the Show of 1880. The cause is attributable to the unusually dry season; this does not apply to the potato crop, the samples of which were excellent. The other field roots, with the exception of turnips were also of fair quality. Garden vegetables being the exception to what may be otherwise termed a fair show in this class.

In agricultural implements, your Directors did not deem it prudent to offer any prizes, those articles as a rule being manufactured at a distance, and exhibited by agents, either after being sold and in use or prior thereto. The representatives of the manufacturers were permitted upon the grounds free of any charge. The same rule was experimentally extended to some articles manufactured in the township, which, upon reconsideration your Directors deem advisable, if considered worthy, should be again placed upon the prize list.

In domestic manufactures 157 entries were made, although in some branches there was no competition. Taken as a whole a marked improvement both in style and manufacture was visible, many of the articles being new in design and of superior workmanship. Your Directors are pleased to observe that exhibitors have become alive to the stringent rule adopted that every article must be the manufacture or production of the year in which it is exhibited.

The ladies' department, as in all Exhibitions, was the most attractive. It is a settled question that, in all gatherings worthy of the name, the attendance of the fair sex adds much to the success of our Annual Shows; our own township is no exception to the rule, and will rival with any in making a creditable display of the handiwork of its fair competitors. To say that the display of the present year was fully equal to its predecessors is only giving a slight acknowledgment of the growing interest taken. The want of room in displaying to advantage the articles exhibited is much felt, and the construction of another building has become a necessity, and ought to be considered prior to next Fall Show. Application should be made to the Corporation wherein the Show is held for assistance to erect a suitable building.

Your Directors have thus given you a brief synopsis of their proceedings during the past year, showing the progress made by the Society. They annex to this report the receipts and expenditure during the same period, and ask your co-operation in assisting them to carry out the object for which these Societies are formed, believing as they do, that they have proved beneficial to the advancement of agriculture in its different branches.

ESSEX, NORTH.

In a steadily progressing portion of the County like North Essex, there cannot be much change looked for in agricultural reports.

Your Directors are happy to say that on the whole the affairs of the Society have an upward tendency.

As you are all aware, the last fall exhibition of this Society was held at the Village of Woodslee, on Tuesday and Wednesday, the 11th and 12th days of October last. The first day's weather was all that could be desired, and the receipts at the gate netted only $53. On Tuesday night there was a very heavy rain which left the roads in a bad condition, and the receipts at the gate on Wednesday only amounted $112.25. The number of entries in all classes was 808 against 1,088 the previous year, or 208 short of what they were in 1880.

There was a decrease in the entries in every class except horses and sheep. Your Directors regret to notice the decline in the other departments of the exhibition, and consider that it is owing to the fact that the South Riding Fair, held a few days previous, took place at Kingsville, near by, and that during the time of this exhibition a number of Township fairs were being held, which would naturally divert more or less the attention of the exhibitors. Taking this view of the matter, it is a question whether or not it would be advisable to amalgamate our funds for Exhibition purposes, and hold one fair, or whether it is advisable to diminish the number of prizes on heavy manufactures and increase the value on premiums left. The hope of winning a large prize is a greater incentive than a certainty of securing a lower premium of a small amount of money.

The inferiority of some of the cattle exhibited at once suggests the necessity of improving the breeds, as it is as expensive, and more so, to keep poor stock than a better class.

Taking this view of the matter, it is a question to be seriously considered, whether it would not be advisable to purchase some male animals that would be for public use.

Maidstone and Sandwich.

Your Directors in retiring from office beg to report that the Society is on good standing, financially, although they have had an outlay of $267.91 during the past year, they have now in hand $373.27.

In the month of April last, the Society purchased a Short Horn Durham Bull at Hyde Park, which cost them about $140 delivered here ; he is a very fine animal, and has been entrusted to Mr. Thomas Batten, of Gesto, and Mr. Batten has been bound in the sum of $200 to keep him in good condition for the use of the Society until the sixth day of March, 1885, and then he will become his own property. The Society are to pay Mr. Batten $7 per year for his keep. The other five bulls kept by Messrs. McCarthy, Mooney, Greenaway, Ellis and Jones will become their own property on the 7th day of March next, and it will be necessary for the Directors to procure others to take their place.

In April last, the Society also purchased four suffolk boars at a cost of $60, these were sold to members of the Society on the second day of May last, and are to be kept by the purchasers for the use of the Society until the first day of May, 1883.

Tilbury West.

The annual Exhibition was injuriously affected by the dry season, both as to the quantity and quality of live stock and various serials. Pasturage had proved scarce, and in some localities an inadequate supply of water was experienced. In cattle and horses the show was below an average, but some good draught horses were brought forward. Fruit, owing to the season was also inferior, and the crop short.

The Society had made no appropriation for purchasing improved stock, for breeding purposes, as it frequently did, nor had a ploughing match been held. Payment had been completed for the purchase of the Exhibition grounds, and a hope is expressed that a greater interest will be felt in the future in the important operations of the Society.

ESSEX, SOUTH.

At the close of another year your Secretary begs leave to report as follows :—That the Seventh Annual Exhibition of the Society, was held in the Village of Kingsville, on the 3rd and 4th days of October, 1881. The Show was a very creditable one, when we take into consideration the unfavourable state of the weather, and the partial failure of certain crops. The number of entries made were less than those for the last two years, nor was the attendance of spectators as good, if we are allowed to judge from the receipts taken at the gates. The exhibition of horses was very good, many fine carriage, draught and general purpose animals being on the ground. The show of cattle was equal to that of any previous year, some very fine thoroughbreds being on exhibition. The show of sheep was very good, consisting of fine Leicesters, Cotswolds and Southdowns. The display of swine was more than usually attractive. Of grain some remarkably fine samples of wheat, corn, oats, barley and other grains were exhibited, while roots did not present as attractive an appearance as on other occasions. The greatest deficiency, however, appeared in the display of fruit, the number of entries falling far short of that of other years; yet, notwithstanding, many fine specimens of the different kinds of fruits were shown. We had a representation of dairy products. Home manufactures were well represented. Some very handsome furniture was on exhibition in the hall, and a number of fine, stylish carriages were on the grounds, together with a fair representation of farming implements.

The ladies made a very full and attractive display of useful and fancy work, which attracted the critical notice of large crowds of visitors during the whole time of the exhibition.

The number of entries made were as follows :—Horses, 101 ; cattle, 60 ; sheep, 52 ; swine, 39 ; poultry, 32 ; seeds and roots, 188 ; fruit, 122 ; dairy products and provisions, 34 ; home manufactures, 66 ; ladies' work, 127.

We regret to report that the crops of 1881 have not been as good as the crops of the past two or three years.

The wheat crop in many localities was poor, the yield upon the whole being about 30 per cent. less than the previous year ; oats were about an average crop ; corn from 25 to 30 per cent. below an average ; potatoes less than half a crop, and fruit a failure.

The high prices, however, obtained for all kinds of farm produce has very nearly compensated the farmers for the shortness of the crops.

Your Secretary has to report the organization of a Township Agricultural Society in North Colchester, and that the Secretary of the same has filed with him the declaration of membership required by the Statute, so that now we have no part of the South Riding unrepresented by a local Society.

During the past year the Agricultural Association of Ontario grouped together six Counties, viz. :—Essex, Kent, Lambton, Middlesex, Elgin and Oxford, and offered prizes for the best managed farms therein. It is to be regretted that but one entry was made in the whole County of Essex. The invariable excuses made by the farmers for not competing, when solicited so to do, were that their farms were not in a fit state of preparation, their fences were bad, their buildings were out of repair or unfit, their fields were not laid off properly, their farms were not properly drained, if drained at all, and so on to the end. It appeared a great pity that the farmers of this County, possessing so many advantages over those of less favoured localities, should not have been prepared to take advantage of the offers thus made, and so far redeemed themselves from the well-merited charge of careless and slovenly farming. The report of the judges on prize farms is a very

interesting and instructive one, and well worthy of a careful perusal, and, no doubt will be productive of much good, by directing the attention of the farmers to a more careful and systematic course of husbandry.

It would not perhaps be out of place in this Report to refer to the work of the Agricultural Commission appointed by the Ontario Government in 1880 "to inquire into the agricultural resources of the Province of Ontario, the progress and condition of agriculture therein, and matters connected therewith," whose Report is now published, and contains a vast amount of valuable information relative to all branches of agriculture. At present, however, we would more particularly refer to what is to be learned from the reports from our own County. It is gratifying to our pride to learn that we live in a County whose climate is more mild and genial than any other in the Province, and whose soil is unsurpassed in fertility and fruitfulness; that it is well adapted to the production of all kinds of grains and roots; that for the production of corn it is equal to many parts of the great West; that it is well adapted to the raising of stock, such as horses, cattle, sheep and swine; that our pork is equal to that produced in the West, and always brings the highest price in the market; that our fruit is unsurpassed; that we have all the necessaries and many of the luxuries of life; in a word, figuratively speaking, we have a "land flowing with milk and honey." All this is very gratifying. We feel proud of our County, and justly so. Nature has done wonders for us. So much from the favourable side of the Reports; what do we learn from the other side? We confess to a feeling of humiliation when we turn to the other side, when we learn that farming operations have been performed in a very haphazard and slipshod manner, without method or system. Very little attention has been given to the rotation of crops. No special attention has been given to the making of, and the utilizing of manure; underdraining is a thing almost unknown or unpractised, while in too many instances we learn that stock, especially young stock, have to pass a long and dreary winter, ill-fed, unsheltered and unhoused. One gentleman facetiously describes the mode we practise in raising steers for market, by stating that "we starve them pretty well the first year, and starve them the next two years, and feed them pretty well for the last half year that they have to live." Such are the two sides presented to our view by the Reports under consideration. It is for us to say whether we will profit by the suggestions thrown out, whether we will go on as heretofore, and impoverish our soil, or whether we will endeavour to restore it to its once normal and fruitful state. It was wisely said at one time by a great statesman, "That a man who made two blades of grass grow where only one grew before was a benefactor to his race." Let us, therefore, strive to make the best of our opportunities, strive to become useful to our fellowmen, and, by properly using the means placed at our disposal by an all-wise Providence, we have the promise and assurance of success in the end.

GRENVILLE, SOUTH.

The President and Directors of the South Grenville Agricultural Society beg leave to report as follows concerning the Twenty-third Annual Exhibition of the Society, which was held on the Society's grounds at Prescott, on the 20th, 21st and 22nd of September, 1881:—

The weather on the first and second days was very fine, but on the third day rain commenced to fall in the morning and continued all day, which prevented the attendance of any paying visitors.

The display of horses in the several classes was above the average of former years, especially when we take into consideration the absence of Mr. Wiser's stock, he not wishing to compete against the farmers in his own county.

The cattle shown, in Durham, Ayrshire and grades were very fine, and the number of entries largely in excess of former years.

The number of sheep on exhibition was greater than for some years past, and a great improvement was noticeable in the breeding of the animals.

Hogs were not up to the average of former years.

The exhibition of poultry was very fine, the entries being in excess of former years, and the varieties shown were numerous.

Dairy products were much below the average in point of number of entries, but the samples of butter and cheese shown were of very superior quality. The falling off in this section was no doubt mainly due to the continued dry weather for several weeks previous to the Exhibition.

In agricultural implements the Exhibition was not as large as on some former occasions.

In grain and seeds the competition was very keen, there being a much larger display than for many years previous. Wheat, rye, oats, and barley were the finest ever seen at our Fair.

The show of flowers was very poor, owing to the long spell of dry weather previous to the Exhibition.

Roots, field crops and garden vegetables were above average of former years.

Carriages, waggons, cutters, etc., were not numerous, but those shown were of fine workmanship.

The display of stoves and tinware exhibited by Keeler & Mason, of Prescott, was very fine, and worthy of special mention.

In woollens and cottons, the number of entries was below average, but some of the articles on exhibition were of very superior quality. The same remarks would apply to the ladies' work.

Owing to the lack of interest taken in the Exhibition by the merchants of Prescott, the space allotted to them was poorly filled, the only creditable display being that of Messrs. A. Davis & Brothers, who had on exhibition a very large and fine assortment of dressed and raw furs, ready-made clothing, gents' furnishings, etc.

The Directors take much pleasure in returning thanks to J. P. Wiser, Esq., M.P., for his very liberal donations in the form of special prizes.

Your Directors would urge the necessity of a united effort on the part of the inhabitants of town and country in trying to make the Exhibition of 1882 surpass all previous ones.

Edwardsburg.

Your Directors, in presenting their Annual Report, have much pleasure in stating that although the prize list was considerably enlarged above the past year's, the Treasurer's Report, which will be laid before you, shows a balance to the credit of the Society of fifty-two dollars and thirty-eight cents.

The Exhibition held in Spencerville, on the 5th and 6th days of October last, may be fairly called a success. The number of visitors who attended the Fair show that the interest taken by the public generally in the Edwardsburg Fair is steadily increasing.

The show of horses and cattle was very good. In cattle particularly there was a marked improvement.

In the sheep department there was also a slight improvement, being mostly of the Liecester breed.

The show of hogs, with the exception of a few brood sows, was rather inferior, and will altogether likely continue to be so, unless larger prizes are offered to induce farmers to take the trouble to bring them from a distance.

The cereal crops on the whole were scarcely up to the mark, barley being somewhat discoloured, and oats light. Although Edwardsburg is not considered a wheat producing township, nevertheless some excellent samples were exhibited.

The show of potatoes, roots and other vegetables were as usual a splendid sight, and greatly admired by the people visiting the Show.

The display of fruit was very creditable to this section of the County.

The show of poultry was fair, most of the different breeds being represented.

In the ladies' department there was a slight falling off, and your Directors would recommend that their successors will offer sufficient inducement to stir up the ladies to make their department more attractive in the future.

GREY, NORTH.

During the year just ended eight several meetings of the Board were held for the transaction of the necessary business of the Society, namely, on the 19th of January, the 29th of January, the 15th of March, the 5th of April, the 26th of April, the 9th of July, the 25th of July, the 19th of November, and the 17th of December.

Four Shows were held, viz. :—Seed Fair, 15th March; Spring Show, 26th April; Fall Show, 4th and 5th October, and Christmas Show, 17th December.

At the Seed Fair 31 entries were made by 17 exhibitors—14 of the entries were of wheat, 5 of peas, 7 of white oats, 2 of black oats, 1 of six-rowed barley, and 2 of Timothy seed. In 1880 the total number of entries was 21 by 16 exhibitors.

At the Spring Show 15 entries were made by as many different exhibitors—4 of heavy draught horses, 6 of roadsters, 2 of bulls over two years of age, and 3 of bulls under that age. In 1880 the total number of entries was 12, by 11 exhibitors.

At the Fall Show 1195 entries were made by 119 exhibitors, to 113 of whom awards of prizes were made. In 1880 the total number of entries was 905, by 123 exhibitors, to 102 of whom prizes were awarded.

The number of members in 1881 was 186, in 1880, 202—showing a falling off of 16.

The number of entries in 1881 was, as shown above, 290 in excess of those of 1880, the increase being made up as follows—horses, 5; cattle, 12; sheep, 27; swine, 3; poultry, 3; grain and seeds, 34; vegetables, 79; fruits, 36; manufactures, 20; domestic manufactures and ladies' work, 29; plants and flowers, 73; while there has been a decrease in field and hoed crops of 31, and in dairy produce of 3, both probably caused by the exceptionally dry character of the summer.

The introduction of plants and flowers into the Show was never attempted before, except during the union with the Owen Sound Horticultural Society, but from the interest and attractiveness attaching, it may be wise to continue the experiment further, as the probability is that it will bring new support to the Society.

At the Christmas Show, there were 63 entries made by 23 exhibitors—Cattle, 20; sheep, 16; swine, 6; poultry, 22. In 1880 the entries were 62, by 28 exhibitors.

The revision and preparation of the prize list for the Fall Show was, at the meeting of the 15th of March, remitted to a special committee which reported on the 5th of April, on which date the report was carefully considered, and, after some slight alterations, finally agreed to and adopted as printed and distributed to the members. In so far as the Directors are aware, the arrangement of prizes made has met with general approval, and is regarded as being calculated, if continued, to draw to the Society an accession of members, more particularly in Owen Sound, to whom no inducements were before held out.

The prize list of 1881 was also satisfactory to members in another respect, namely, in the increased value of the prizes offered. In order to maintain ability to continue such increase, however, it will be necessary that more effectual endeavours shall be put forth to increase the membership and to improve the financial position of the Society; for while in 1880 the number of members was 202, and the amount of subscriptions $372, in 1881 the membership was but 186, and the amount of subscriptions $187—only $1 in excess of half that of 1880.

Assuming it to be beyond dispute that mercantile communities are in the greatest degree dependent upon the agricultural class for success in business, and that the more progressive and prosperous agriculture is the better does commerce thrive, it may be regarded as a somewhat surprising fact, that there is not a business man in Owen Sound, who is a contributor to the Society at all, whose subscription is in excess of the amount required by law to constitute membership. In centres of business elsewhere such a condition of indifference is not found to exist, but considerable donations are from year to year made to Agricultural Societies by those whose substance is being increased by their dealing with the farming community, in order to encourage the existence and promote the success of this means of improvement, and to afford a practical illustration of their interest therein, and an acknowledgment of the mutual dependence on each other of

agriculture and commerce. How or why it is that Owen Sound should be an exception in this respect the Directors do not feel called upon to explain or to account for—they content themselves with noting the fact, and with drawing attention to it.

The audited financial statement for 1881 is hereto annexed showing that there is a balance in the Treasurer's hands of $198.99. From this, however, there will have to be deducted an amount of $47.50 for prizes yet unpaid, and the sum of $14.15 for postages due to the Secretary and Treasurer, and for moneys paid out by the Secretary for sundry articles required in the preparation of the halls and grounds for the Fall Show, so that the actual balance available hereafter will be $137.34.

In order to prevent the allowing of prize money to lie in the Treasurer's hands unclaimed, the Directors on the 11th December, 1881, passed the following by-law:—"Each and every person to whom a prize is awarded at any Exhibition of this Society shall claim the same, and apply for payment thereof on or before the twenty-eighth day of December next following the award of the same, and failing to do so such prize or any number thereof unclaimed, or for payment of which application has not so been made, shall become absolutely forfeited."

The Directors hope that by this means the business of each year will be fully settled up within each year.

On the table members will find a Report of the Council of the Agricultural and Arts Association for 1881; communications relative to the Canadian Shorthorn Herd Book; copies of the *Farmer's Advocate*—a monthly journal dealing with matters of interest to the agricultural world; a copy of the *Canadian Farmer*—another journal of the same character; and a circular from the Secretary of the Agricultural and Arts Association respecting prizes for the best managed farms in a described section of the Province of Ontario for 1882. All these documents are of interest, and merit attention.

On the table is also a tabulated statement of the entries made in the several classes at the Fall Shows from 1873 to 1881 both inclusive.

GREY, EAST.

The Directors of East Grey Electoral District Agricultural Society, in presenting their Seventh Annual Report, take great pleasure in congratulating the members of this Society and the agriculturists of the county generally on the great success attending their labours during the past season.

Although for a time things looked rather gloomy, when, in the beginning of June, the crops then flush with sap, looking vigorous and promising, the frost came cutting them down in some parts of the country, until there was scarcely anything in the shape of vegetation to be seen, indeed the hopes of the farmer for a short time seemed almost blighted. But behind a frowning Providence there was hid a smiling face. The genial showers which fell, accompanied by heat, caused nature as it were again to rally; the crops revived, and now, with the exception of hay, an abundant harvest has been reaped and saved in good condition, and good prices being realized for all kinds of farm produce, makes this one of the most prosperous years the farmers have been blest with since the first settlement of this part of the country.

The Township of Artemesia Agricultural Society was united with East Grey Electoral District Society in the past year for exhibition purposes.

The Exhibition was held on the Society's grounds at Flesherton in October. The weather on the whole was favourable, and there was a good attendance of members and visitors. . . . .

The Exhibition of 1881 was an improvement on all former Exhibitions held in this place. Although your Directors have still cause to regret the comparatively small number of thoroughbred cattle exhibited, horses, sheep, pigs and poultry were fully up to the average of past years.

In implements and vehicles there was still some improvement noticeable.

In grain there was a good exhibit of all kinds, excellent in quality.

The show of roots and vegetables in the true sense of the word was extra.

In the ladies' department, fine arts, and domestic manufactures, the articles exhibited were excellent in quality, and beautiful in design and finish.

And last, but not least, comes the dairy produce. In this class there was a large exhibit, and indeed so excellent was the quality that a considerable time was spent by the judges before they were able to decide which was best.

KENT, EAST.

It is with pleasure that we state that the past year has been no exception to the usual prosperity of this Society. In many respects it has surpassed all former years. Its membership shows a marked increase, as does also the number of entries; and the receipts at the gate were considerably in excess of any former year. These facts are sufficient to show that all the elements of a strong and progressive agricultural society exist in East Kent.

The Spring Show of horses was good, and some fine animals were on the ground, showing a marked improvement in this important branch which is much needed.

Your Directors purchased two bulls of Frank R. Shore, of Westminster, which were sold by auction, but owing to want of proper competition they were sold at a slight loss to the Society; still it is only by importing and grading that we may hope to compete in foreign markets.

The Show of bulls in the spring brought out a good exhibit from our leading stockmen, and every prize was keenly contested for; also the animals were in fine condition, showing conclusively the wisdom in the change of exhibiting this class in the spring rather than in the fall.

The exhibit of cattle showed no marked improvement on former years, but some fine animals were on the grounds, which the enterprising exhibitors deserve credit for; but it shows conclusively that this most important branch of industry is sadly neglected, and if we do not wake up from our lethargy and improve we cannot hope to compete in the exportation of stock to foreign markets.

The show of sheep was in advance of former years, and the different classes were well represented. Some splendid animals were exhibited, making a grander display in this important branch than a great many Fairs of more pretensions.

The show of hogs was good in quality, the different breeds being well represented, showing that our farmers are alive to this most important branch of industry.

The exhibit of fruit was good for the year. Apples especially were well represented, showing some fine varieties of good quality.

The season was one of unusual dryness, which interfered materially with most crops. Wheat was, however, a good yield, and of fine quality; oats exceptionally good; corn was below the average, as also was beans. Root crops suffered severely, although remarkably fine specimens were exhibited. The dairy department shows great progress from year to year. The ladies' department was much better than usual. The show of agricultural implements was good, and the great improvements made from year to year are very gratifying to the farmer.

Your Directors erected a large and commodious building for the exhibition of poultry, and deemed it ample for years to come, judging by the past exhibits in this department, yet the new building was filled. Slight changes in the coops will double the capacity of this structure.

They also erected a comfortable office for the Secretary, which when finished will be well suited for holding meetings of the Directors.

Your Directors would respectfully suggest that immediate steps be taken to enlarge the grounds, believing the growing wants of the Society demands this.

The present position and future prospects of the Provincial Exhibition attracts much attention, and your Directors suggest that the meeting discuss that matter, that your opinion may be known in the matter.

Your Directors are sensible that much remains to be done to fully develop the agricultural resources of East Kent, yet they cannot refrain from congratulating you upon the great progress already made.

Harwich.

Your Board, in making their Twenty-seventh Annual Report, are pleased to say that the general state of the Society, financially and otherwise, is highly encouraging. On account of heavy rains on the first day of the Fair, and the forbidding aspect of the weather on the second morning, the entries were not so numerous as on some former fair days, still the entries numered between 1000 and 1100. The gate money summed up some $209.25, and the sum offered in prizes was $404.50.

The show of horses, cattle, hogs and sheep was good. The horses especially exceeded any former show, both in number and quality of the stock.

The heavy spring rains, succeeded by a long continued drought, had the effect to seriously damage the growth of grain and root crops in some localities, and in consequence the entries of grain and root crops were to a considerable extent diminished, but your Board are happy to say the quality was good.

Your Board imported two car loads of potatoes, which were sold to the members at cost, and thus distributed through the Township with good results. . . . .

KENT, WEST.

Raleigh.

In the beginning of the year your Directors purchased twenty-three breeding ewes in the County of Oxford, which were sold to the members by auction, realizing about $30 less than cost. We also purchased 504 bushels of oats, which were also sold to the members at a trifle over cost. We feel that money expended in the importation of good stock and seed grain has a beneficial effect on the farmers of the township, as it is only by using the best males and sowing clean seed we can keep up the value of our herds and the quality of our grain. . . . .

The wild lands in the township are now rapidly being taken up. A number of stave mills have been erected and in operation, giving the settler a chance of disposing of his timber. Farmers from the Eastern Counties, finding the quality of land we have here adapted for the producing of all kinds of grain, fruits, etc., are settling in the township, consequently the demand for land is becoming greater, and has risen in value fully 25 per cent. the past year.

Your Directors held their Show in the fall, but the want of accommodation and the the unfavourable weather prevented many exhibitors and visitors from attending. Your Directors feel that, unless proper accommodation can be obtained, the Show will have to be held in some other locality.

In regard to stock shown we can say that in cattle, sheep and pigs we excel any other township in the county, as reference to the county prize list will show. . . .

LEEDS, SOUTH.

Crosby, North.

The Directors of the North Crosby Agricultural Society, in presenting their Annual Report, beg to say that the past year has been one of improvement and prosperity with us as a Society.

In the past year we have leased a piece of ground for a term of years, inside of the Corporation of the Village of Newboro', its situation and appearance being the most

beautiful of any Exhibition ground in the Riding. It is on a black oak plain, mixed with pine, which has been trimmed up and cleared off by a general bee of the Society. The village of Newboro' has built a splendid track by private subscription, which was supplemented with a grant by their municipality. The Society has fenced the ground, and made some other improvements in building sheds for grain and roots, and pens for stock, at a cost to the Society of $243.58. Our grounds may be truly called one of nature's ornamental grounds.

There has been a marked improvement this year in horses, cattle and sheep. The judges of horses spent the most part of the second day in the discharge of their duties, which have been more arduous than in any other class.

Cattle has improved very much in a few years by the use of thoroughbred sires.

The hall or ladies' department was splendid, being tastefully arranged, and presenting an appearance far in advance of any former Exhibition.

The Society has by one bound cleared her former deficiencies of exhibiting stock by the roadside or on the highway as the case might be. And we feel as if we have and are able to compare favourably with our County Society. The Newboro' brass band kindly tendered their services gratuitously, which cheered and enlivened the proceedings of the day.

MIDDLESEX, EAST.

In reporting for your information the proceedings of your Directors for the past year, we would first express our gratitude for the blessings we have received, and our sorrow for the loss by death of an active and energetic member of our Board, William Bolton, since our last annual meeting, and also for the loss of Mr. William McBride, the faithful and efficient Secretary of the Western Fair, who was one of the victims of the lamentable calamity on the 24th of May. Your Directors felt it to be their duty to present addresses of condolence to the families of those gentlemen, as a tribute to their memory, and these addresses were duly engrossed and presented.

The past season has been very favourable for the farmers of this county; there has been good crops and high prices for nearly everything grown on the farm. The only drawback was a severe drought in the latter part of summer that injured the pastures and hindered the fattening of beef cattle. This was quite a loss, as owing to the high prices paid for cattle to export it has become a very important branch of the agriculture of the county.

We are inclined to take a very hopeful view of the prospects of the farmers of this part of Ontario. It is a common opinion that the farmers of America are generally ruining their land by over-cropping and bad management. We do not believe this opinion will apply to this county; we are convinced that our farmers, by procuring better implements and more thoroughly working and draining their soil, and by producing more beef and cheese instead of depending principally upon grain, are actually improving their land. And we are satisfied that in general the old farms in our county are more productive now than they were twenty years ago.

We still hold the $5,000 we received for the land on Talbot Street. We have paid the interest on that sum every year, in addition to our subscriptions for the support of the Western Fair, and we offered on several occasions to call a special meeting of the members to authorize the expenditure of the principal in completing the buildings on the exhibition grounds, on condition that the city gave us a guarantee that we should have the use of them for at least twenty years. That guarantee we could not obtain.

Our principal reason for insisting on this guarantee was that we could not believe that the citizens would consent to the expenditure of a large sum of money, sufficient to improve the grounds and put the buildings in good order, unless they were first assured that they would be retained for exhibition purposes. On this point we are happy to say we were entirely mistaken. The city has spent upwards of $20,000 in judicious improvements on the grounds, and putting the buildings in good order. This we consider constitutes a material guarantee that the grounds will be permanent, equal, if not superior,

to a written one. And we are now prepared to recommend that your Directors be authorized to expend the $5,000 in your hands in permanent improvements on the grounds whenever they may be required, on the simple condition that the money should be repaid to your Society whenever the grounds are changed.

As the Provincial Show was held here last year we had no Show of our own. As an exhibition the Provincial was all that could be desired, and fully confirmed our experience that London is the best place in the Province for an agricultural exhibition.

The Treasurer, Mr. D. McKenzie, lays before you the financial statement for the past year. It is a satisfaction to know that we had a larger number of members present at the annual meeting last year than ever before, and we are pleased to see a very large attendance to-day—it shows that you are taking more interest in the management. This encourages your Directors to do their duty. It is rather too much to expect that they should devote their best attention during the whole year without pay, to promote your interests, when the majority of the members are too careless so spend one day to attend the annual meeting.

The Western Fair accounts show that there is a balance of $5,850 in hand, independent of the sums held by our Treasurer and the City Society.

Our prospects for a large attendance at the Fair next fall were never better—we have a good surplus on hand. The cloud of uncertainty about the occupation of the grounds has vanished, the grounds themselves and buildings have been vastly improved. These advantages, with the prestige the Western Fair has already gained, give us good reason to anticipate that we shall have a larger Exhibition next fall than we have ever yet seen in London.

MUSKOKA.

The Directors present the following Report for the year now ended :—

The number of members was 116, an increase of one over the number of the preceding year, and the amount subscribed by them was $121.

The following are statistics relating to last Fall Show in October, 1881. The receipts at the Show ground gate amounted to $189.86, being $37.70 more than what was taken at the preceding Show.

The value of prizes offered was $530.75, apportioned as follows :—For horses, $83 ; cattle, $108 ; sheep, $80 ; pigs, $31 ; poultry, $14.50; produce, $117.75 ; manufactures, $41.25 ; and ladies' work, $55.25. There were 45 prizes offered for horses, 67 for cattle, 64 for sheep, 20 for pigs, 22 for poultry, 121 for produce,34 for manufactures, and 66 for ladies' work—in all 439 prizes offered.

The number of entries was 712, being 74 increase over those at preceding Show. Of these 52 were for horses, 53 for cattle, 100 for sheep, 23 for pigs, 14 for poultry, 300 for produce, 43 for manufactures, and 127 for ladies' work.

Comparing these figures with the corresponding ones of the preceding year we find an increase in the number of entries. In cattle, 12 ; sheep, 31 ; poultry, 1 ; manufactures, 22 ; and ladies' work, 35 ; and a decrease—in horses 1 and produce 12. In pigs there was no difference.

The value of the prizes awarded to successful competitors was $356.50, apportioned as follows, viz. :—For horses, $57.50 ; cattle, $44 ; sheep, $55 ; pigs, $21.50 ; poultry, $7.25 ; produce, $106.50 ; manufactures, 21.25 ; and ladies' work, $43.50.

There was a marked improvement in the ladies' work department, and on the whole the Show was a decided success. The judges expressing their hearty approbation of the exhibits.

The new building which it was necessary to erect on the Society's Show ground is a good substantial structure, 70 feet long and 30 broad, and presents internally and externally a very different aspect from the old one, than which it is 10 feet longer and 6 broader, and well floored. It was erected at a cost of $426.3. It was necessary to raise the sum of $300 to enable the Society to have such a building.

A ploughing match was got up under the auspices of the Society, the expenses of which were all defrayed by subscriptions and gifts from private individuals, and there is a surplus in hand towards the expenses of another ploughing match next fall. Decided success attended the efforts of the Committee, and the decisions of the judges gave general satisfaction.

NORTHUMBERLAND, EAST.

Your Directors, in making this their Annual Report, desire to record their thankfulness to an all-wise Providence for the blessing of an abundant harvest, and more than remunerating prices for every article which the farmer has to sell. Coming as it did after a series of crops much below an average, and almost a stagnation in the produce trade, its beneficial effects has been felt, and we trust appreciated by all classes of the community. The gloom and despondency which enveloped the energies of every part of this Riding has, as if by magic, disappeared, and those farmers, who but a few months ago were almost discouraged at the prospect before them, are now to a great extent freed from embarrassment, and pushing forward with renewed hope and vigour. Knowing as we do that this great change has been brought about almost entirely by the prosperity of the agriculturist, how important it is for the well-being of our county that every means should be employed to secure its continuance—a result which we do not fear to assert is much more under the control of the farmer than many seem to suppose. The annual Show of this Society was held in the Village of Warkworth, on the 6th and 7th days of October last. The attendance at the Show on the second day was large and numerous. The entries being about twelve hundred, equal to any previous Show of this Society, the classes being generally well represented, and a keen competition was manifested in each department.

In the class of horses your Directors are pleased to report that there was a very good show, the class being well filled, but would recommend that some steps be taken for the introduction of a heavier class of horses which would be more adapted to the wants of the farmer. Your Directors have great pleasure in reporting that in thoroughbred stock of Durhams and Ayrshires both of these classes were well represented, and the competition was keen, which reflects great credit on the exhibitors, who have at great expense introduced this class of stock in the Riding.

The class of grade cattle, was well represented, and showed a marked improvement.

The long wool sheep—this class was well represented, and there was close and keen competition.

Pigs—this class was also well filled, and some very fine animals were on exhibition.

The display of ladies' work was very good, and the Directors beg to thank the lady friends of members for their very succesful exhibit in this department, which adds very much to the interest of our annual Show.

Your Directors are fully satisfied that agricultural societies have done much good in bringing into competition the various articles and animals shown at exhibitions, and they would strongly urge upon the Officers and Directors for the ensuing year the necessity of putting forth every effort to further the interests of this Society.

Cramahe.

Your Directors, in presenting their Report, beg to acknowledge their thanks to the Giver of all Good for the many blessings they have received at his hand during the year.

The Society commenced the year under a cloud, having a balance due the Treasurer of over thirty dollars.

There was a slight falling off in the membership from last year—the number in 1880 being 122 against 115 in 1881.

The Annual Exhibition was held at Castleton on the 14th of October, 1881, and was

not up to former years, for some cause not known to your Directors. There was a great falling off in the number of entries, their being only 400 against 780 last year, and 788 in 1879.

The show of horses was equal to former years.

Cattle not quite as good as former years, and less in number.

Sheep were few in number, but those present were equal to last year.

Pigs were well represented and of good quality.

In poultry there were some good birds shown.

In grain the display was small compared with former years.

Roots, except potatoes, were almost a failure this year in this locality.

The show in the hall was small compared with other years, but there were some good paintings and ladies' work.

The crops of wheat, rye, barley and oats were good both in yield and quality.

Peas, buckwheat and corn were below the average this year, and in some instances almost a failure.

Barley is fast becoming the main crop in this locality, and last year there was a good deal sown, on account of the poor yield of spring wheat in 1880, and prices ruled high when you take into account the large amount raised.

It has been noticed by your Directors that the show of stock depends greatly on the condition of the pasture in summer, for when the pasture is good and stock in good condition they are taken to the fairs, and when the farmers are coming with their stock they fill their waggons with articles for the inside show.

Your Directors believe there is a good deal of valuable information given to members by the Society sending a copy of the *Farmer's Advocate* to each member free.

Your Directors cannot close this report without expressing their thanks to the Hon. S. C. Wood, Commissioner of Agriculture of the Ontario Government, for the valuable Report of the Commisssoners appointed by the Ontario Legislature to collect information on agricultural subjects. A copy of which has been received by each Director free.

Seymour.

In reporting the proceedings of the Society for 1881, your Officers and Directors beg to say that the increase of members this year over last is 19. The number paying their subscriptions on or before the 1st of August is 68, to each of which a copy of the *Farmer's Advocate* has been sent as heretofore.

The Annual Show was held on the 15th of October, rather later than for some years past, owing to the desire not to interfere with others in the neighbourhood. The day being unusually wet till afternoon the show of stock was consequently less than that of former years. In the hall the show of wheat was excellent in quality, and more entries than last year, and the same in barley. Peas and oats being about as usual. In potatoes and turnips though these crops in the township are below the average the number of entries were about as usual, and the quality all that could be desired. In fruits there were fewer entries, and on the whole varieties were medium in size. Vegetables about as usual and of excellent quality.

In procuring Judges your Directors experience more or less difficulty every year, and the past was no exception, owing perhaps to the unfavourable state of the weather; after all the decisions were generally in accord with the opinion of the public, and gave perhaps as much or more general satisfaction than usual.

In agriculture or horticulture your Directors are not aware of anything new or of special importance having taken place in the neighbourhood.

In other industries since last Report a pulp and paper mill has gone into effective operation in the township, on the River Trent, and during the summer a large and splendid woollen mill has been erected on the same river, in the Village of Campbellford, nearly in the centre of the township, in which the machinery is being set up, and is expected to be running in a short time.

NORTHUMBERLAND, EAST.

Hamilton.

Your Directors, in presenting their Annual Report, are pleased to announce an increase of membership as compared with last year. There were 97 members last year, and 122 this year, 1881, making an increase of 25.

Your Directors again decided to unite with the County Society for the purpose of holding a Union Exhibition, believing it better than the old plan of holding separate Township Shows, and knowing it meets the approval of most of the members of the Society, they feel satisfied that the same course will be continued with advantage to the Society. The Union Exhibition was held in the town of Cobourg, on the 18th and 19th of October, and was up to the average of quantity and quality of articles and farm produce, and also in the quality and number of farm stock on exhibition. The number of visitors was as large as usual, notwithstanding the weather was cold and unfavourable, and had the weather been warm and pleasant the attendance would doubtless have been much larger, and your Directors would suggest that the Show be held ten days or a fortnight earlier in the future, if at all practicable, as they believe the receipts at the gate would be much larger if suitable weather could be secured.

Your Directors again offered the sum of $30 in prizes for field roots, and 19 entries were made, the usual fee of twenty-five cents being paid with each entry, but the frost coming on rather severely before the judges commenced their work, a number of those who had entered mangolds secured their crops, in consequence of which it was resolved not to judge the remainder of the root crop entered for competition, but to refund the entrance fees, believing it was the best that could be done under the circumstances.

While the root crop has not been so good as usual, especially the turnip crop, yet your Directors are glad to be able to congratulate the Society, and the farming community in general, on a good harvest on the whole, and the good prices that most farm products command in the market, and the consequent improvement in the times in general.

In conclusion, your Directors would urge upon their successors in office the need of a little push to still further increase the numbers and usefulness of the Society.

OXFORD, NORTH.

The Directors beg respectfully to submit the following as their Report for 1881, and trust that it will meet with your approval and adoption.

It affords them much pleasure to state that the Blandford Agricultural Society again united with this Society for exhibition purposes. The United Boards worked harmoniously and with very satisfactory results. This union widens the special interest taken in our institution and extends its popularity and influence, besides, the additional income accruing to this Society from the union amounting this year to $177.05 is a very material help to it in the way of increasing the prizes. We hope that the Blandford Society will again unite with us and assist in maintaining the prestige which our Society has acquired. To other Township Societies in the Electoral District we would say, come and do likewise, and remove the ground for the complaints so frequently heard that there are too many Agricultural Exhibitions.

At the last Annual Meeting, Henry Parker, Esq., was unanimously appointed delegate for the elections of a member of the Council of Agriculture and Arts Association of Ontario, and at the same time the desire of the Society was expressed that Mr. Parker be elected as member of said Council for Division No. 9. The Directors are pleased to report that at the meeting of the Delegates held here on the 18th February, he was unanimously elected to that position. We congratulate him on his appointment. Previous to his taking his seat as member of the Council, and since the Provincial

Association has been somewhat under the weather, so much so that one of the Delegates remarked that they were only sending Mr. Parker to attend its funeral: we think however that it has considerable vitality in it yet, and we would express the hope that it will long live as the farmers' institution, and that the suggestions made for its freer, more economical and profitable working will be adopted by the Provincial Legislature.

The Directors have much pleasure in recording in this Report the fact that at the competition for the prizes awarded by the Agricultural and Arts Association for the best managed farms in Group No. 2 comprising the Electoral District Societies of Essex, Kent, Lambton, Middlesex, Elgin and Oxford; the gold medal was awarded to the Vice-President, W. Donaldson, Esq., East Zorra. His success was hailed with satisfaction throughout the Riding, and we rejoice in it as maintaining Oxford's reputation as the garden of Canada.

The Directors influenced by the success which followed the revival of the Seed Grain Fair in 1880 resolved to hold another this year. It was accordingly held on the 9th March. There were 33 entries in the different classes. Of the seed grain exhibited, spring wheat had the pre-eminence in quantity and quality. There were 12 samples of 10 bushels each, and every bushel was sold at good prices. There was a like demand for the other grains. The attendance of farmers in quest of good seed grain was large. As the Seed Grain Fair is never self-supporting, and is conducted solely for the purpose of supplying an opportunity for the ready disposal and purchase of superior seed grain, we bespeak for it a still greater patronage.

The Stallion Fair was held on the 13th April at the rear of the Market Square. $101 were offered as prizes in the different classes of horses. Probably owing to the heavy state of the roads the number of horses exhibited was smaller than usual, there were only eleven on the ground, the carriage purpose class being most largely represented. The turn out of spectators at the Fair was very good.

The Autumn Exhibition was held on the 19th and 20th September. The Directors resolved to hold it thus early to avoid collision with other Exhibitions, and because these days were the only free days between the Toronto and Provincial, and besides they thought they would lay hold of the agricultural public in the first blush of their Exhibition enthusiasm for the year. The result proved the wisdom of of the selection. Some of the County Shows held this year are reported as being comparative failures, whereas ours was a large and successful one. The entries came in in full tide and reached a height beyond that any previous year. It deserves notice that the exhibitors came early with their entries of and thus the disagreeable crowding at the Secretary's office on the days of the Exhibition was avoided. It is hoped that the same course will be followed in future. It would be out of place to dilate upon the merits of the exhibits in the different classes. In common with other Exhibitions of this year the display of fruit, flowers, roots and vegetables was owing to the excessive drouth not so large and fine as usual, but in all the other classes the exhibit was up to and beyond previous years. This was especially so in the case of horses. These were 475 entries. The show of carriage, roadster and young horses was very fine, and was pronounced by competent Judges to be even ahead of Toronto Exhibition. This great and successful feature in this year's Exhibition was no doubt largely due to the prize inducements, first prizes ranging from $6 to $20. The total of prizes offered for horses was $547, of this sum $201 were specially subscribed. . . .

PEEL.

The Directors of the County of Peel Agricultural Society in presenting their Twenty-ninth Annual Report would do so with pleasure, and wish to congratulate the members on the present aspect of affairs both in the County generally and in connection with our Society in particular.

The Spring Fair was held on the 20th of April: the attendance was good; the exhibition of stock was excellent, and the amount of gate money was $71.76.

According to advertisement, the Chisholm Prizes were awarded for the best farm house, outbuildings and grounds, the object being to encourage the improvement and comfort of farmers' homes. The award by the Judges appointed by your Board has given entire satissaction, and the three successful competitors were, Andrew Roberts, on Lake Shore, first prize, $75 ; Wm. Elliott, 5th Line East Chinguacousy, second prize, $50 ; and Joseph Featherston, Credit, third prize, $25.

Your Board, also, in conjunction with the Town Council, have established a Monthly Fair, which has been fairly well attended.

The Fall Fair as usual was held on the first week in October. The weather was good, and the attendance better than last year. The gate money, always an interesting item in our Fair, was $1,218 ; in1880 it was $1,153.

Your Board have had under their consideration the subject of having only a two days fair, and they would recommend their successors to consider whether it would not be well to accede to the almost unanimous wish of the exhibitors to have the next Fall Fair for only two days.

The subject of reducing the debt of the Society, has also been under discussion, and a scheme has been proposed which, if carried out, would no doubt relieve the Society of probably the greater portion of our debt which is very desirable.

Your Board have had a communication from the Secretary of the Provincial Association of Agriculture and Arts, with regard to the raising the standard of pedigree for admission into the Herd Book of Canada in accordance with the views and wishes of breeders and others interested in pure bred stock.

From the same gentleman a communication has been received intimating that prizes would be offered of $30 and $20 for each of the following subjects :—

1st. *Manures.*—Their preparation, application, and effect on growing crops and increasing the fertility of the soil. Competition restricted to practical farmers.

2nd. *The Homestead.*—Its arrangement and surroundings, having regard to comfort, and convenience, economy, health, and appearance. Open to general competition.

Also, that a system of competitive examinations in the science and practice of agriculture, comprising tillage, raising crops, breeding, fattening, and management of stock, dairying, forestry, etc. The object being to induce young people engaged in farming or intending to do so to prepare themselves by a course of reading etc. for examination in those subjects at convenient centres, who shall receive certificates of merit or scholarships according to their proficiency in answering questions comprised in the given papers.

Your Board think this a step in the right direction, as scientific as well as practical farming must be the order of the day for Canada. . . .

PRESCOTT.

Your Directors beg to say that the past Exhibition has been the most successful since the formation of the Society.

In the horse-ring a more excellent display of animals could hardly be seen. Parties who attended the great Exhibition at Montreal acknowledged, that in the different classes of horses shown Montreal was nowhere.

In cattle the same might be said, save and except some overgrown animals fed at breweries or distilleries ; but, taking the County at large, the Exhibition was grand.

Sheep were shewn that could and would compare favourably with the best western. although bred and wintered in this cold clime.

And as for Pigs, the Society can challenge the whole Province to produce better.

The show of grains, seeds, and roots could not be beaten in the Province. Even those that witnessed the same or like productions, exhibited by the agent from Manitoba at the Dominion Exhibition, did voluntarily acknowledge that the County of Prescott can compete with the whole Dominion (although no railways or Syndicate) in the production of good, sound, and reliable root crops.

Your Directors would beg leave further to remark, that the debt which in former years overshadowed the Society has wisely been swept away, and that henceforth there will be nothing to hinder the progress of the Society in advancing the several interests of agriculture and arts within the County. The Government wisely grants certain moneys for the purpose of aiding and forwarding the agricultural interests in and over the whole Province; and if the farmers, mechanics, and all others interested, will avail themselves of the free-will offerings granted, nobly come forward and compete, not so much for the small prizes offered, but for the honour of competing in an honourable way, letting selfishness go—then the Society will prosper; otherwise all hopes are vain. . . .

RUSSELL.

The Directors and Officers of the County of Russell Agricultural Society have much pleasure in stating that the Exhibition of the Society, which took place in the Village of Metcalfe, on the 6th day of October, was a marked success over any former show, the attendance from all parts of the County and the City of Ottawa being larger in numbers. In stock of all classes a very marked improvement was noticed. More especially in horses, the heavy draft and the agricultural class made a fine exhibit. The cattle shown were good. There was a good exhibit of Durhams and Grades. A good deal is owing to the manner the Township of Osgoode has been devoting its funds of late years, which has been in the purchasing of Durham Bulls, which has had the effect of producing a class of excellent grades. The members of the Society now feel that they have more greatly benefitted in that way of the disposal of their funds than if they had applied it towards exhibition purposes. The Exhibition Hall showed to good advantage, it being held in the Drill Shed, which is large and commodious. The same was well filled. There was an excellent display of butter of good quality. In cheese the entries were not large, but were good. The varieties of grain show the samples could not be excelled, especially in fall and spring wheat. The Ladies' Department, which was an attractive part of the Exhibition, added very much to the appearance of the Hall, and the display in that department was good. Vegetables and roots were on an average.

The harvest throughout has been abundant in the County generally. The wheat crop, especially the fall wheat, which was largely and extensively grown, yielding in many instances fifty bushels to the acre. Other cereals generally were on an average.

In conclusion, your Directors have much pleasure and satisfaction in congratulating the farmers and others upon the general prosperity.

SIMCOE, EAST.

The Directors of the East Simcoe Agricultural Society, in compliance with the Act, beg to submit their Report of the proceedings of the Society for the past year, and in doing so, have much pleasure in congratulating the Society on the continued success of their Exhibitions. In consequence of the long continued drought during the summer, the roots were not by any means as good as last year, the entries were not as numerous, nor the quality as good; neither were the dairy exhibits as good as last year. In the other departments the exhibits were quite numerous, and equal to former years. In cattle we noticed a great improvement in all classes, particularly the Durhams. The entries were numerous in this class, and it is evident that the farmers are going in for breeding that class more than heretofore. The fat cattle would have done credit to Smithfield market, and were fine specimens. The entries for horses were ahead of all other years, and the competition keen. There were about the usual number of entries in the ladies' department. The samples of grain of all kinds were very good, considering the dry season. The weather during the exhibition was fine, and the attendance large, the gate money being

$70 more than last year, and the general receipts about the same. Your Directors have much pleasure in stating that all the accounts against the Society are paid, but to do this they had to get a note discounted for the sum of $136, which will have to be met out of the funds of the coming year. Your Directors have much pleasure in informing you that there is now a good prospect of a liberal grant being made annually by the County. The proposition to be laid before the County Council is as follows:—On motion of Mr. Edmondson, seconded by Mr. Partridge, That in carrying out the suggestions of the Standing Committee on Finance and Assessment of the County of Simcoe at next session, the following scheme for the proposed grant and appropriation of $1,000 to the three Electoral District Societies be recommended to the County Council of Simcoe, to be considered at the January session, viz.: that the said $1,000 be granted annually, on condition that an Annual Show be held in each year in one of the said Ridings, and that no one of the said Associations shall receive such grant more than once in every three years, but so that each Association shall hold the said show, and receive the said grant once in every three years, the time and place for holding the first three of said shows to be fixed by the three Associations at a meeting of delegates hereafter to be called for said purpose, said delegates to be composed of three representatives from each Association. The application will come before the Council at their first meeting, and, if the grant is made, deputations from each district are to meet in Barrie, and arrange the place for holding the first grand show. . . . .

SIMCOE, WEST.

The Directors beg to report that, in presenting to you a statement of their proceedings during the past year, they have the pleasure of informing you that the Association financially and otherwise is in a healthy condition. . . . .

No matter what exertions may have been used to bring the Exhibition to a successful issue, the weather proving unpropitious, produced to some extent a partial failure, particularly in a financial point of view. Cold, unfavourable weather may not keep Exhibitions back, but unfortunately it does visitors and seriously deminishes the receipts at the gates. Other casualties, too, were against the Exhibition; through the dry season fruit, roots and vegetables were a comparative failure; very few samples were grown fit for exhibition. The same may be said of grain to a certain extent, although wheat was a good crop, yet the coarser grains were inferior in quality and very few samples were shown. But notwithstanding your Directors do not by any means wish it to be inferred that the Exhibition was not a successful one; all things considered it was decidedly satisfactory. Never was there so fine a lot of Shorthorn cattle before exhibited in Barrie. Several herds might be mentioned which were indeed a credit to the county. Other thorough-breds were not well represented, a fine herd of Devons being the only exception. The show of grade cattle was all that could be desired.

There is evidently a growing desire among the farmers to improve their breeds of cattle, and there is no doubt but the Annual Exhibition where so much fine stock is to be seen, does much to foster such desire. A large number of animals has been sold at remunerative prices out of this Riding this season for foreign markets, and the prospects are that with proper care in raising suitable animals, a large export trade will hereafter be done.

There was an average number of sheep of the different breeds shown, all good of their kind, notably some imported Cotswolds, the property of Mayor Tyrwhitt. The show of swine, poultry and ladies' work may be classed as an average.

Manufactures and implements were below an average. . . . .

In conclusion, your Directors beg to state that they have at different times jointly with the South and East Riding Societies, made application to the County Council for a grant hitherto without success, but they have good reason to believe that if the Associations can agree, a liberal grant will this year be made.

TORONTO, E. D.

Your Directors beg to submit the following Report of their proceedings during the past year:—

In the early part of the season an arrangement was made with the Toronto Horticultural Society to hold, jointly with your Society, the Second Annual Union Flower Show in the Pavilion at the Horticultural Gardens, under the same terms and conditions as those of the year previous, viz.: Your Society taking the sole control in carrying out the Exhibition proper, such as printing and advertising, paying the prizes and raising the funds therefor, etc.; and the Horticultural Society supplying the building and grounds, lighting, etc., and furnishing the musical entertainment for both days, the gross receipts for admission to gates being equally divided between the two Societies.

The Flower Show was held on Tuesday and Wednesday the 28th and 29th of June, and proved even a more successful Show—both in point of excellence of the exhibits and financially—than the one of the previous year; or in fact than those of any Summer Exhibition ever held by your Society.

Great efforts were made to secure the success of this Exhibition; and, as to ensure such a happy issue meant more encouragement to the Horticulturists by the offering of a fuller and more liberal prize list, your Directors carefully revised and enlarged the list of the previous year, and considerably increased the amount to be awarded. That this action on the part of your Directors was instrumental in bringing out the grand display of rare plants, gorgeous flowers, and the large exhibit of fruits—especially strawberries—is amply atttested by the financial statement now presented, and in the Report of Mr. Paxton, who, as Superintendent of the arrangements, also contributed in an effectual manner to this result.

Your Directors in framing the prize list paid particular attention to the suggestion of their predecessors, as made in the last Annual Report, in recommending that a special effort be made to bring out amateur competition, by offering liberal prizes, and thus seek to stimulate a love for Horticultural pursuits. Not only was this effort made, and in the manner suggested, but in addition circular prize lists of the amateur department were distributed from door to door, both in the city and its suburbs, all of which resulted in but 18 entries having been made.

Similar effort might be made next year: but it would appear to be useless to get up a special amateur prize list; rather let it be well known that amateurs, if desiring to compete as such, may, by so marking their entries, enter in competition for prizes in all the professional classes, the amount of prize to be in, say, the proportion of two-thirds of the sum offered to the professionals: an amateur, however, so desiring should be allowed to enter in competition with the professionals, and if successful get the full prize.

The Band of the Queen's Own Rifles carried out an admirable musical programme upon both evenings, and no doubt assisted greatly in attracting the large number of visitors that were present, and which showed a marked increase over the attendance of last year.

The total number of entries in all the classes was 377, while that of the previous year was 186: an increase of 191, or more than double. The number of entries sometimes appear small, but it must be understood that each entry represents from 3 to 100 plants or flowers: collections and table displays counting as single entries.

Following is the Report of Mr. Paxton, the Superintendent of the Horticultural Department:—

"The exhibits in every department were unusually fine, plainly evincing a decided improvement in Horticulture, as a science, since last year. The efforts of the Society to promote a spirit of friendly rivalry have had the proper effect in bringing out not only greater competition, but better cultivated specimens in every section. Most of the foliage plants were a credit to their growers: and the plants in flower were everything that could be desired; more particularly the geraniums, which were marvels of training, and covered with blossom. One new feature in the Show were tables, 4 ft. x 10 ft., filled with plants in pots; this drew out a strong competition, there being five exhibits, and all

of them of such excellence as to render the judging anything but a sinecure. Cut flowers were in abundance, and many of them new and rare. The show of fruit was greatly in advance of anything ever before seen in Toronto. Strawberries brought out a strong competition; the "Great American" and "Sharpless" varieties were splendid specimens of successful culture. The show of vegetables was also far in advance of other years, the variety and superior excellence of which was astonishing at so early a season."

The total subscriptions of members for the year (of which a list will be found hereto annexed with the amount paid by each) was $191; and the amounts awarded in prizes in the several classes (less diplomas taken in lieu of money), $343.75.

The detailed statement of the Treasurer, as examined and signed by the Auditors, shows total receipts for the year, including a balance of $712.57 from the preceding year to be $1,774.92; and the expenditure $940.20; leaving a balance in hand of $825.72.

VICTORIA, NORTH.

Your Directors, in presenting for your consideration the fifteenth Annual Report of your Society, beg to say that, although the past year may be regarded as a highly prosperous one, yet we regret to report that owing to various adverse circumstances the Show held here last fall was not such a success as we were warranted to expect. This, however, was not owing to a deficient harvest, which, upon the whole, was a tolerably fair one, with the single exception of root crops, which were a comparative failure owing to the extremely dry weather of August and September. But one of the evils which operated very seriously against the success of the Society's operations was the extensive bush fires which prevailed throughout this portion of the country, caused by the dry season already referred to, destroying roads and bridges—in some instances cutting off access to the Show—and destroying and menacing private property, thus preventing many intending exhibitors from coming forward to the Society's Exhibition. Another very serious obstacle was the destruction by fire of the Society's Exhibition Hall at Victoria Road at the very time when it was needed, and necessitating the erection of a temporary building for Exhibition purposes. The inevitable result of all these hindrances was a decided decrease in the number of entries from that of former years, notwithstanding the fact that the funds of the Bexley and Carden Branch Society were merged with those of this Society for Exhibition purposes, and many of the prizes offered were increased as well as others added in consequence; and notwithstanding the fact also that the Show was extended over *two* days instead of one, as formerly.

Your Directors have much pleasure in acknowledging the receipt of $20, donation from Hector Cameron, Esq., Q.C., M.P., and the regular annual donation of $200 from the County Council, who certainly are deserving of our grateful acknowledgement. Your Directors are also in receipt of the sum of $400 from the Lancashire Insurance Company —the amount of insurance on the building destroyed by fire.

VICTORIA, SOUTH.

Gentlemen,—We meet now to deliver up the trust you confided to us at the last annual meeting, and upon so doing we beg to report that we only held our Spring Show this year, as you are all aware that the Central Show was held here last fall. Our Spring Show was a good success. In horses we had a good show, and in bulls there was the best show we have ever had at our Spring Fair. Our membership this year was 226—about 26 more than last year. The Ops Agricultural Society amalgamated with us at our last Annual Meeting, and therefore have paid us $20 as share of the prizes for this year. We have received for rent of our grounds for pasture, $77.50; and for rent of stables, booths, and advertising in Central Fair Book the sum of $291.97 was received by

us. We have paid out for spring prizes the sum of $50, and for fitting up and repairs for agricultural buildings and grounds, and interest, the sum of $548.72. We had to pay back taxes on our lot in the South Ward to the amount of $92.88. Our share of the deficiency for Central Fair that we had to pay was $77.10. After paying off all the above we have on hand the sum of $484.45, so that your new Directors will be in a good shape to commence the year, and will be able to pay the interest on the purchase money of our grounds when due. Therefore we have not only to be thankful for the sum we have on hand, but we are thankful for the good crops and prices we have had this fall. Whoever your Directors may be, we hope their efforts may be crowned with as good success next year. If the farmers of the Riding would take the interest in the Society that they ought to take, the membership could easily be more than doubled, and the prize list could be made much more valuable, or at least it would help to pay up the large debt on our grounds.

The establishment of a Farmers' Club in Lindsay for the discussion of farm topics during the winter would, we think, be of benefit to the Society, and would undoubtedly be of great advantage to the farmers. Such Clubs have been established in East Whitby, Markham, and other progressive agricultural districts, and have been found very interesting and profitable.

Emily.

The Directors have pleasure in congratulating the members on the success that has attended the Society during the past year. Our membership has been pretty well sustained during the year just ended, being seventy-six. A Spring Show was held, which was very satisfactory to the Society. The Fall Show was only a moderate success, the weather happening to be very unfavourable. The County grant was $129.64. The receipts from all sources, together with balance from previous year, was $251.25, and the expenditure was $210.88, leaving a balance in hand of $40.37. In conclusion, the Directors express the hope that still greater efforts will be made to further the interests of the Society for the year upon which we have just entered.

Mariposa.

The Directors of the Mariposa Agricultural Society have great pleasure in presenting the Annual Report for the year 1881. The Society has made steady progress during the last few years, and we may here state, that during the six years from 1877 to 1881, the number of members have increased from 89 to 192, being an increase of 103 members. The receipts for the year just named were $332.34 ; in 1881, $496.34, showing an increase in receipts of $164. The disbursements for the same year were $293.90, showing an increase in the disbursements of $180.02.

The interest now manifested by the ratepayers of Mariposa in the Annual Exhibition in connection with this Society, foreshadows for the Society a future that is very encouraging ; and while the opinion has been expressed by many that Township Agricultural Societies should be abolished, and Exhibitions only be held in towns and cities, the steady progress of the Society in Mariposa certainly leads to an opposite conclusion, and we are of the opinion that Township Societies, managed by a staff of efficient officers, can be made interesting and beneficial to rural districts ; and if these Exhibitions were confined to towns and cities, many families who can now visit and take part in them in their own townships would, in a measure, be deprived of the pleasure of visiting the Exhibition in their own localities.

The funds placed at the disposal of your Directors have been carefully and judiciously expended, and although prizes for thoroughbred cattle and a superior class of sheep have been awarded in the past year, the Directors have the satisfaction of knowing that this has met with the general approbation of the members, and the same, though paid, has not injuriously affected the finances, as we find that, after paying all indebtedness for the year, there remains in the Treasurer's hands a balance of $22.42.

WATERLOO, NORTH.

Your Directors for the past year, 1881, beg leave to report that the annexed is a true and correct statement of all the members, and the amount paid by each; also, the receipts and disbursements of the Society for the past year.

Your Directors regret to state that, owing to the extreme drought, our last show was not as successful as former years. There was a slight falling off in the number of entries as well as receipts in general.

We feel it our duty to call your attention to the fact that, unless all the members take greater interest in order to raise funds by way of increasing our members' subscriptions, our Show will not and cannot prosper. If members exert their influence in raising funds and encouraging people to exhibit as they should do, our Shows will become more interesting and attractive. We would recommend the incoming Directors to solicit teachers in rural school sections to collect members' subscriptions, and allow them reasonable compensation therefor.

WATERLOO, SOUTH.

Your Directors would give the following as about the average yield of the several crops harvested in the Riding during the past year, viz.:—Fall wheat, about 18 bushels, good quality; spring wheat, very little sown: barley, good crop and good quality, about 30 bushels, and of bright colour; peas, not an average crop, not so many sown on account of the bug; oats, fair average crop, about 35 bushels; corn, average crop, not much grown; potatoes, fair crop, but small, owing to the dry season; turnips, half a crop, by reason of dry summer and wet fall, in a great many cases unsound; mangold wurtzel, more grown than usual, being found better for dairy purposes, and the yield equally as good as an average crop of turnips.

Heavy draught horses are in good demand, and fair prices can be got for good average horses from Canadian and American buyers. The breed of Percheron horses has been raised to a considerable extent, and have been purchased largely by dealers. The demand for thoroughbred Durham cattle has been better than for some years previous, and good prices have been obtained. There has also been a good demand during the past year for all classes of sheep, especially fine wooled. Pigs have also been in demand, and prices have been good. The principal breeds raised in the Riding are the Improved Berkshire and the Suffolk. A few of the Poland China have been lately introduced, and seem to give satisfaction to those who have raised them. The Berkshires seem to be the favourite breed in this Riding. Poultry has lately improved very much in the different classes of breeds raised, and the demand for dressed poultry suitable for the market has been steadily on the increase for home and foreign consumption, the consequence being a larger supply in our markets and for shipment.

In view of the practically stationary position of both the North and South Riding Societies in this district, your Directors would earnestly recommend efforts on behalf of this Society towards securing an amalgamation of the two Societies, with Exhibitions as desirable, and would ask at your hands the appointment of a committee to confer with the Directors of the North Riding Society with reference to securing this object.

The members will remember that, in the last Directors' Report presented for your consideration, the recommendation was made that correct yearly agricultural statistics should be obtained by the Provincial Government. Your Directors are pleased to see that an Act looking to the accomplishment of this object has been promised by the Government. The collection of such statistics, your Directors feel justified in believing, would prove of great service to the Province.

WELLINGTON, CENTRE.

Your Directors, in meeting you, have to report that the Nichol Agricultural Society amalgamated with this Society, contributing to the funds the sum of $237.48. The Fall Show was held in Fergus, and proved very successful. The weather being very fine, there was a large number of visitors on the ground and in the hall. The receipts of the Society for gate money was $123.62. The stock and produce of the county were well represented in almost every department. The show of horses was very superior. The total number of entries was 909.

The Christmas Show of Fat Stock was also held in Fergus, but owing to the inclement weather and impassable state of the roads, there was not a large attendance, but quite a large number of very superior stock was exhibited.

Your Directors feel that their best thanks are due to the people of Fergus for their warm and cordial support in making the Show a success, as well by their personal exertions as by their liberal contributions to the special prize list, amounting to about $170. We have to state that the Treasurer's books have been audited and found correct, and that they show a balance in his hands to the amount of $141.15. There is still some unpaid claims, amounting in all to about $30.

WELLINGTON, SOUTH.

The Directors of the Guelph Central Exhibition beg you to accept the following report of their proceedings for the year 1881 :—The first meeting took place on the 16th of March to arrange prize list for the Fall Show and time of holding the same, when it was decided to hold the Exhibition during the first week of the Provincial Exhibition, subsequently the exact date being fixed for the 4th October and close on the 6th at 4 p.m. It was concluded that the prize list should remain the same as in 1880, with the exception of the class for sheep—Southdowns were to rate the same as Cotswolds and Leicesters, and a separate class for any other Downs, and to be on the same footing for prizes as the others. In the poultry class prizes were to be awarded for chickens hatched in 1881. It was deemed advisable to offer prizes also for lady riders and drivers, and for a bicycle tournament, and while the former turned out to be a success, your Directors regret there was in the latter only one exhibitor. A class was also added for fat stock through the liberality of some members of the Association. The Directors acknowledge with thanks the liberality of the citizens of Guelph and others in providing special prizes. The Exhibition was held on the dates previously arranged, during most pleasant weather, and if the quantity of stock and produce was not quite equal to the hopes of the promoters the quality was excellent, and in stock the credit of the County of Wellington was fully maintained. The protests were fewer than usual, and while the attendance of visitors had considerably fallen off from earlier years, owing partly to new centres having been opened, your Directors, by judicious management, personal attention and economy in every branch, have the pleasure to report a reduction of the indebtedness to the bank of $500 this year, and they take this opportunity to acknowledge with sincere thanks the kindness of the officials of the Agricultural College for the presence of some of the fine stock maintained in that institution. On the 2nd November a meeting of the Directors, ex-Directors, and friends interested in the welfare of the Association took place in the City Hall, agreeably to previous announcement in the local journals, for the purpose of devising the best means of liquidating the claims on the Society. The meeting was well attended, and after a long debate it was decided to instruct the Secretary to prepare books with the following resolutions recorded in them : That subscriptions now be taken up for the purpose of paying off the debt of the Society, and that the same and all future subscriptions be published in the Guelph papers, such subscriptions to be made payable on or before the first day of March next, and the Board of Directors and ex-Directors be

requested to solicit for the above object. Said books to be handed to the Directors to solicit subscriptions to be payable on or before the 1st March, 1882. During the meeting subscriptions were furnished for $210, this sum added to a balance in the hands of the Treasurer of about $200 leave a deficiency of $600 to be made up and render the Association free from debt, which your Directors hope will be accomplished, and enable this Society to commence a new course of usefulness and success.

YORK, NORTH.

The revolving cycle of time has again brought about the period for holding another annual meeting of this Association, and in presenting a report of the Society's operations for the past year, your Board has pleasure in being able to congratulate the membership upon increased popularity as compared with the previous year, and in some respects over that of any former year of its history. A slight increase in the membership, a reduction in liability on capital account, with a marked increase in the list of prizes, offered and paid, distinguishes the operations of the Society over some years past, while a widened circle of competitors at the late Fall Exhibition, would seem to imply that the inducements offered, by an increased and enlarged premium list, was a move in the right direction, alike satisfactory to the membership and to your Board. . . . .

The Fall Exhibition of stock, grain, seeds, roots, fruits, dairy, agricultural implements, general manufactures, ladies' work, fine arts, etc., held on the Society's grounds and floral hall in Newmarket, on the 4th and 5th days of October last, with perhaps the one exception of the agricultural department, was quite equal to most former years, and, as a proof of the exhibits being more widely diffused than usual, nearly ever prize offered in the several classes was drawn. The display of horses, as usual, was excellent: cattle fair; sheep, a decided improvement, both in quality and quantity; pigs, about an average; poultry excellent; and the exhibits in the floral hall, with the exception of fruit, a decided success. Of course the weather militated somewhat against exhibitors, and also contributed to lessen to a considerable extent the attendance of visitors. . . . .

During the year the general prosperity of this section of country, alluded to in last annual report, has continued, and fair prices realized for farm produce generally, and, with perhaps the single exception of fruits, the average of other farm products equaled, and in some cases excelled, the preceding year. During the year several enterprising farmers of the Riding have introduced thoroughbred stock into this section, an evidence of progress, which your Board notes with much satisfaction; and would also take the liberty of commending our farming community to patronize and encourage. . . . .

In all the years of the past, while the Association has been labouring under considerable debt, the Committee on Grounds and Buildings have discharged the duties devolving upon them without fee or reward, and at personal sacrifices, but now that the Association is in a position to pay its way, this special demand upon the sacrifice of those who labour for its success appears to your Board unnecessary. Your Board would therefore recommend that, in future, the Committee on Grounds be allowed an indemnity of fifty cents each for every day they are called together for actual business, and your Treasurer be authorized to pay the same. These meetings usually take place from six to eight times in a year, not unfrequently called for the forenoon; and it does appear reasonable to your Board that the actual expense of meals for said Committee, and feed for their horses, where their labour is gratuitous, should be paid by the Society.

Your Board would consider the present report quite incomplete without making special reference to the Appendix herewith submitted, showing the names and amount subscribed by a number of friends of the Association as special prizes at the late Fall Show, aggregating altogether the sum of $369.50—a much larger list than in any previous year. Your Board entertain the conviction that these special prizes contributed in no small degree to the general success attending the late exhibition, by superinducing increased competition, and stimulating other departments of the Society's operations.

All honour to those friends, therefore; and your Board would ask the membership to remember their kind interest in the success of this Association.

Following the action of other large County and Central Fairs, your Board, in preparing last year's prize list, offered about twenty Diplomas instead of money premiums—largely in the agricultural implement department—with very general satisfaction; and although it increased for the one year the item of printing account, yet as sufficient were competed for, in another year or two, a general saving will be the result.

Returns from the several Township Societies in the Electoral District have been received, and are reported to be in a reasonably flourishing condition. The reports from Whitchurch and the Union Society of Georgina and North Gwillimbury are full, and furnish much information of practical value; the others merely furnish financial statements but no details.

Georgina and North Gwillimbury.

After the Annual Meeting in January, 1881, the Directors, with the assistance of the other officers of the Association and the people generally, determined to make the Fall Show of 1881 superior, if possible, to any previous one held here.

There were nine meetings of the Directors and officers of the Association held during the year, at which matters of moment to the Society were discussed. Tickets were issued and an excellent prize list was published. Although only one hundred and eighty-two members' tickets were sold before the first day of August, still the officers of the Association were not disheartened. Circulars were sent by the Secretary to a large number of gentlemen living at a distance, inviting them to be present and act as judges in the different branches of exhibits. In response to this a number attended, and a better set of judges could not have been had at any of the largest Shows in the Province. Ladies, too, were invited from a distance to act in their special departments, and very kindly accepted the invitation, and performed their labours admirably. The Show was held on the 13th and 14th days of October, and as an exhibit it was considered by many to be equal to any of the Shows in the county. His Worship the Mayor of Toronto was present, as also Dr. Strange, M.P.

In 1880 the officers of the Association resolved upon having the Show ground fenced and a building erected. It was a serious undertaking, but it has been a success. In the two years, 1880 and 1881, we have paid about $320 on account of the fencing and building, leaving a balance of only some sixty dollars still due. This has been done out of the gate money alone, none of the funds of the Society proper having been used for that purpose. . . . .

The Annual Meeting this year was held in Sutton on Thursday, January 12th. A large attendance of farmers and others from both townships was present, and the proceedings were hearty and vigorous, showing that the people are beginning to take a greater interest in these shows than heretofore.

King.

It is with pleasure I have to say our Township Agricultural Show, held in Schomberg October 18 and 19, was as usual quite a success. The first day opened up very cold and stormy, making the attendance limited, the receipts at the gate being only some $30. The second day opened up with most delightful autumn weather, and the people seemed to avail themselves of the opportunity and turned out splendidly, there being upwards of three thousand on the grounds. The display of exhibits was very good. In the horse and cattle departments not so many were shown as in some previous years, but they were of superior quality. Sheep excellent, with a keen competition. Pigs very good. Poultry unusually large. Roots and vegetables, competition good, a fine display. Owing to an agreement between the larger manufacturers of implements, they do not exhibit at the smaller Fairs. In ploughs, Messrs. Allen & Nelson were the principal exhibitors: and in carriages, Lawrence Bros., of Bradford, and McGeary, of Bondhead. Dairy and fruit

were a fine display, Mr. John Perry being one of the principal prize winners in fruit. In the ladies' department the display was large, filling the hall, and of excellent quality, and assisting materially in making the show a great success. . . . .

Whitchurch.

The Directors in submitting their Annual Report, beg to acknowledge the Divine blessing of peace and plenty to the people of Canada, which have been uninterrupted except in small districts where fire got beyond the control of human energy, and reduced the unfortunate residents of those localities to extreme want and suffering.

Your Directors do not feel justified in passing this subject without suggesting the propriety of the Government making an appropriation to relieve the suffering of those who had nothing left from the fiery fiend, the only equitable and sure way which the wants of a deserving number of families may be met.

To say we have had a good harvest, is a faint expression for the bountiful yield of the past year, wheat having in many cases yielded over 40 bushels to the acre, and other crops proportionately large. With the bountiful supply of nature and all the protection that the most extravagant agriculturists could desire, the farmers ought to be a happy people, and the manufacturers roll in luxury.

The Society's Fall Show was held in the village of Stouffville on the two last days in September. Venor had been consulted, and the weather was furnished with an addition to the contract. At about 12 o'clock, the second day of the Show, an unusual amount of wind put in an appearance, and at the same time the canvass tent in which certain classes of the Show were exhibited disappeared. This canvass tent was the one under which the first Provincial Show was held, and its admirers will be pleased to learn that it came to the "centre of civilization," from which to take its departure to that long resting place "from which no traveller returns." All the classes in the prize list were well represented and taken collectively or individually would be considered exceedingly good and compare favourably with any Township Show. The financial report is a proof of the successful management of the Society, there being a balance sufficient to meet any emergency. There is a great deal of complaining by exhibitors at the Judges decisions, a difficulty your Directors do not expect to remedy until the Society is able to offer a first prize for every animal or article put on exhibition without charging members subscriptions or gate fees.

The Township Agricultural Societies have done much to improve the methods of farming, and have been a stimulant to the introduction of a better class of animals, but your Directors are of opinion that the time is approching, if not already arrived, when these objects can be equally well obtained from County Shows with a saving of time and a fairer distribution of prizes.

YORK, WEST.

"Labour with what zeal we will
Something still remains undone;
Something uncompleted still
Waits the rising of the sun."

So writes the poet Longfellow, and your Directors can re-echo his sentiments now that the time for presenting their Annual Report has arrived, for though agriculture has made such gigantic strides within the past decade or two, yet each year we learn that let us

"Labour with what zeal we will
Something still remains undone."

Many valuable hints have been given to the farmers of our country in books written by men who understood whereof they spoke; books which, owing to the wonderful facilities offered by the printing press, are literally within the reach of all. A great deal of information, too, is given monthly or weekly in the columns of the agricultural magazines and weekly

newspapers of the country, which are to be had at surprisingly low rates, and in this Province of a very high standard of excellence. No doubt many of the ideas put forth in the various articles and treatises referred to have been adopted either wholly or in modified forms by men living in our own district, and these men have, peradventure, profited directly or indirectly by the knowledge gained. Now if our own practical farmers, who have in the course of their agricultural career gleaned from constant observation numbers of useful items of knowledge, would in their leisure moments send the fruits of their experience to some live paper, how the benefit would spread, and how one man after another would replenish his store of information, derive lasting good from his brother farmer's careful noting of occurrences in his daily round of farmer's life. And here it may be well to remark that the local papers, those which are of us and for us, espousing the cause of our own locality, as opposed to the great papers of the cities, should receive our support as farmers, in every way, both by promptly paid subscriptions and by the furnishing of those items of news which crop up from time to time, and which we know will prove of interest to the farming community of our Riding.

Horses.—It will not be necessary in this report to say much on the subject of horses. We must all know from experience that a good horse will always find a market, and bring a good price. It was a source of gratification to your Directors to see so many really fine horses on the speeding track at the Fair of 1881. The horse ring always attracts a crowd of admirers, and certainly on that day it was not to be wondered at that so much attention was centred in it. The feeling of the owner of horses so noble as to carry off the palm from among so many fine animals must of itself, apart from the prize, be a full reward for the care which has been bestowed upon the victors.

Cattle.—The demand for milk, butter, cheese, and beef seems likely, owing to the rapid growth of our cities, to increase, and so the products of the farm in this particular will be eagerly sought for. The high prices commanded by butter of superior quality in the Toronto market this fall shows that there is no danger yet of too great a supply, but it must be borne in mind that butter to find satisfactory sale in the market which we mention, particularly on account of its being the chief market for our county, must be carefully made. The butter of Canada has not always had a good reputation abroad, probably on account of the slip-shod manner in which some of it was prepared on the farm, and afterwards packed in some country store, where the man detailed to do the work had more zeal than knowledge, or more muscle than taste; and the choice butter that did come in being absorbed by the customers of the store, the other heterogenous mass was sent off for disposal to, shall we say, boarding-house keepers or foreign commission agents. Prime beef is always wanted, and if our stock-raisers will go on improving their stock so as to produce the best quality of milk, butter and cheese, and to raise real good sterling beef fit to please the heart of an Englishman in Christmas week, they may well expect to reap their reward.

Sheep and Pigs.—In like manner we might speak of these useful members of the farm stock community, in so far as excellence is concerned. Place your standard high, make it your aim to keep abreast with, or if possible a-head of, your neighbours in the matter of having good stock, and all indulging in so proper rivalry, how grand must be the result in a comparatively short time.

Poultry.—There is room for improvement in this department, and it is a department that should on a well regulated farm be a highly profitable one. There are times in the year when eggs command a splendid price in the villages and towns close at hand without going to the city at all. It might prove a very good plan to give the children a practical financial interest in the poultry yard, with system and with common sense, and give them a good big dividend out of the profits for their own use and benefit.

Bees.—We now come to another department, and though the workers in it are very silent, yet they do a great deal of work, and as a rule find their board at a very small cost to their owners. Why should not bees be more generally kept on the farms of York County? Most people like honey, it is always saleable, and we think that a suggestion as to a more general move in this direction should prove sufficient.

The Fall Fair of 1881.—Unfortunately for the Fair this year, the prevelance of fever in the village of Woodbridge, and the spread throughout the country of the most

widely exaggerated reports of the seriousness of the trouble, militated against its success very much indeed. All the circumstances, however, being taken into account the Fair proved fairly successful, and the number of entries, though not up to last year's record, was yet a very respectable one. We give the figures for 1881 and 1880 :—

	1881.	1880.
Horses	205	259
Cattle	65	70
Sheep	90	101
Pigs	50	49
Poultry	83	88
Roots	81	113
Vegetables	101	59
Fruits	54	101
Grain and seeds	84	64
Implements	41	64
Dairy produce	116	71
Home manufactures	90	120
Ladies' work	356	378
Fine arts	53	61
Extra	19	23
Totals	1,488	1,621

Annual Dinner.—The annual dinner was partaken of at the Inkerman Hotel, where a large number of members and guests of the Society assembled, and a pleasant time was spent, several interesting speeches being made.

Acknowledgment.—We deem it right to say that the Toronto daily papers *Mail* and *Globe*, and some of our local papers, including the *York Herald*, Richmond Hill, and *Conservator*, Brampton, had reporters at the Fair, and gave lengthy reports of the proceedings, for which reports the Society is obliged to the proprietors.

Agricultural Commission.—Your Directors must not neglect to bear testimony to the valuable work of the Agricultural Commissioners, who have gone very fully into the subject of what is profitable in farming for the farmers of Ontario, and who have also pointed out the most approved methods of grappling with the various dangers to and enemies of successful farming.

Agricultural Implements.—These helps, or indeed we may now say necessities, to the farmer are so numerous that it would require volumes to make even a brief mention of them; suffice to say that "progress" is evidently the watchword of the agricultural implement manufacturers of the land, and they make it their aim to keep fully abreast with the energetic spirit of the times. The steam thresher has made wondrous strides of late years, and your Directors feel that this county is to be congratulated as being the one where portable engines for threshing purposes were first manufactured in Canada.

Gratitude for the good harvest which we have enjoyed, and for many temporal blessings and mercies to us as a community, we feel that we ought in the fulfilment of our duty, as your Directors, to place on record our gratitude to Almighty God, the Giver of every good and perfect gift, who has been pleased to grant us immunity from war, wide-spread pestilence, famine, or other grevions affliction.

"O Lord of heaven, and earth and sea,
To Thee all praise and glory be;
How shall we show our love to Thee
Who givest all?

The golden sunshine, vernal air,
Sweet flowers and fruit Thy love declare.
When harvest ripen Thou art there,
Who givest all.

For peaceful homes and healthful days,
For all the blessings earth displays,
We owe Thee thankfulness and praise,
Who givest all."

TABULATED ANALYSIS OF REPORTS

OF

Electoral District and Township Agricultural Societies

AND OF

HORTICULTURAL SOCIETIES,

FOR THE YEAR 1881.

ANALYSIS of Reports of County and Township Agricultural Societies and of Horticultural Societies.

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Total of Receipts.	Balances due Treasurer
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Addington:	.....	100 00	700 00	.....	.....	.....	.....	.....	12 00	812 00	17 50
Camden	33 78	113 00	130 00	.....	.....	.....	.....	.....	.....	276 78	.....
Loughboro'	4 77	68 00	86 00	.....	.....	.....	.....	.....	.....	158 77	.....
Portland	1 46	50 00	61 00	.....	.....	.....	.....	.....	.....	112 46	8 54
Sheffield	.....	70 00	73 00	10 00	.....	.....	.....	.....	.....	153 00	.....
Algoma:	2 33	278 00	700 00	25 00	16 13	.....	32 66	.....	0 50	1054 62	.....
Assiginack	.....	56 00	140 00	.....	52 00	.....	.....	.....	.....	248 00	96 76
Howland	64 73	41 00	144 00	20 00	.....	.....	.....	.....	.....	267 73	.....
Brant, North:	828 14	320 59	700 00	.....	377 73	.....	.....	.....	103 30	2329 67	.....
Onondaga	4 86	74 00	140 00	20 00	.....	.....	.....	.....	9 00	262 31	.....
Brant, South:	.....	843 75	700 00	300 00	1203 44	7000 00	.....	.....	.....	10046 19	141 36
Burford	20 35	268 00	140 00	.....	411 25	.....	.....	.....	13 00	852 60	.....
Brantford Horticultural	.....	79 50	140 00	.....	11 25	.....	.....	.....	.....	230 75	.....
Bruce, North:*	107 73	82 00	700 00	.....	.....	.....	.....	.....	.....	889 73	.....
Union Exhibition	.....	290 75	.....	150 00	494 69	.....	.....	602 06	.....	1537 50	.....
Arran	62 42	157 00	52 45	30 00	37 96	.....	.....	.....	.....	339 83	.....
Bruce	111 83	397 00	138 34	.....	46 20	.....	.....	.....	4 00	697 62	120 56
Elderslie	.....	102 23	.....	.....	.....	.....	.....	79 50	.....	181 73	.....
Saugeen	6 31	86 00	30 62	30 00	119 50	.....	.....	†221 67	88 50	582 60	.....
Port Elgin Horticultural	19 96	107 00	40 67	75 00	119 50	.....	.....	.....	.....	362 13	.....
Tiverton Horticultural	22 09	168 50	62 19	.....	6 00	.....	.....	.....	.....	258 78	.....

* United with Elderslie for Union Show in Paisley.

† Port Elgin Horticultural amalgamated.

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden, and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Addington:	38 62	350 00	166 00	55 25	157 55	.....	.....	.....	.....	.....	61 08	829 50	.....
Camden	.....	.....	118 00	45 20	69 60	.....	.....	.....	.....	.....	27 15	259 95	16 83
Loughboro'	.....	.....	82 65	40 85	19 25	.....	.....	5 00	.....	.....	7 00	154 45	4 32
Portland	.....	.....	50 65	14 35	35 50	.....	.....	.....	.....	.....	20 50	121 00	.....
Sheffield	.....	.....	56 00	22 55	47 15	.....	.....	.....	.....	.....	22 84	148 54	4 46
Algoma:	.....	280 00	101 00	95 00	38 00	.....	47 50	.....	.....	47 35	*418 45	1027 30	27 32
Assiginack	61 69	.....	97 50	45 25	18 50	.....	.....	.....	.....	25 35	96 47	344 76	.....
Howland	.....	.....	66 75	35 35	25 50	.....	.....	.....	.....	.....	65 65	193 35	74 48
Brant, North:	.....	140 00	733 00	177 50	161 25	.....	11 00	.....	.....	80 00	242 05	1544 80	784 87
Onondaga	.....	.....	151 75	46 00	28 00	.....	.....	.....	.....	.....	31 23	256 98	5 33
Brant, South:	49 04	280 00	†1285 25	426 00	234 50	.....	184 00	.....	.....	7368 73	592 28	10187 55	.....
Burford	.....	.....	‡280 00	75 25	83 50	.....	27 75	.....	.....	275 47	123 71	831 43	21 17
Brantford Horticultural	.....	.....	.....	126 75	.....	.....	.....	.....	.....	29 09	71 88	227 72	3 03
Bruce, North:	.....	420 00	.....	.....	.....	.....	9 10	.....	329 13	.....	52 00	810 23	79 50
Union Exhibition	.....	.....	621 50	192 75	171 50	.....	3 00	.....	§161 75	95 11	291 89	.....	.....
Arran	.....	.....	122 25	70 50	55 50	.....	.....	.....	.....	60	68 71	317 56	22 27
Bruce	.....	.....	‖234 75	.....	.....	.....	5 50	.....	.....	473 11	104 82	818 18	.....
Elderslie	.....	.....	.....	.....	.....	.....	.....	.....	¶92 23	.....	10 00	102 23	79 50
Saugeen	.....	.....	165 75	107 25	105 75	.....	.....	.....	.....	80 38	114 66	573 19	9 41
Port Elgin Horticultural **	.....	.....	.....	.....	.....	.....	.....	.....	312 17	.....	9 96	352 13	10 00
Tiverton Horticultural	.....	.....	.....	120 00	.....	.....	.....	.....	.....	101 63	25 50	247 13	11 65

* Including $329 for books and expenses of sending products to Toronto Exhibition, etc.
† $231.25 of prizes unpaid. ‡ $31.25 unpaid. § Balance to County and Elderslie Societies.
‖ Total—not classified. ¶ Union Exhibition. ** United with Saugeen for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grant.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Bruce, South :*	3 30	224 45	700 00							928 05	
Northern Exhibition	67 84			300 00	1289 63			1323 79	414 54	3395 80	
Brant†	2 03	58 00	26 82							86 85	
Carrick		153 00	69 46	50 00	51 55					324 01	12 25
Greenock		117 00	48 10	25 00	38 50					228 60	0 87
Huron	2 94	177 00	83 00	20 00	35 70					318 64	
Kincardine	26 53	49 50	39 31	20 00	6 08				35 44	176 86	
Kinloss	256 59	227 00	101 75	110 00	152 94					848 28	
Walkerton Horticultural‡	11 70	102 00	47 17							160 90	
Brockville, E. D.:		132 20	700 00	100 00	548 27				34 00	1514 47	
Cardwell :	166 19	95 00	700 00		203 65			302 19	170 30	1637 34	
Adjala		96 00	140 00	25 00	28 50				5 00	294 50	
Albion		49 00	73 00						5 00	127 00	24 88
Tecumseth§	166 19	45 00	66 00	25 00				120 75		422 94	
Caledon	101 83	146 25	140 00	100 00					5 00	710 00	
Carleton :	88 97	413 50	700 00	500 00	334 87				30 00	2067 34	
Fitzroy		77 50	105 00							182 50	3 54
Gower, North	7 32	112 00	105 00		14 00					238 32	
Huntley	14 00	139 00	105 00		33 00					291 00	
March	1 57	83 00	105 00						9 85	199 42	
Cornwall, E. D.:	65 60	211 00	350 00		190 65					817 25	

* United with Northern Exhibition. † United with Northern Exhibition. ‡ United with Northern Exhibition. § United with E. D. Society for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Bruce, South:	.....	416 23	.....	.....	.....	.....	.....	.....	492 64	.....	5 88	914 75	13 30
Northern Exhibition	.....	.....	*707 25	360 75	436 75	.....	76 50	.....	.....	1341 05	508 90	3229 70	166 10
Brant	.....	.....	.....	.....	.....	.....	.....	.....	80 00	.....	6 75	86 75	10
Carrick	51 25	.....	105 00	70 00	54 00	.....	.....	.....	.....	26 01	30 00	336 26	.....
Greenock	17 79	.....	60 50	39 50	24 25	.....	.....	.....	.....	55 00	34 68	231 72	.....
Huron	.....	.....	111 00	74 00	38 75	.....	.....	.....	.....	.....	77 00	300 75	17 89
Kincardine	.....	.....	52 75	35 94	15 50	.....	.....	.....	.....	.....	37 18	141 42	35 44
Kinloss	.....	.....	148 00	82 00	30 00	.....	.....	.....	.....	125 00	178 68	563 68	284 60
Walkerton Horticultural	.....	.....	.....	.....	.....	.....	.....	.....	150 90	.....	.....	150 90	10 00
Brockville, E. D.	155 96	.....	†492 50	253 00	337 06	.....	.....	.....	.....	71 31	358 11	1406 37	108 10
Cardwell:	.....	419 00	330 75	186 00	182 00	.....	.....	.....	120 75	67 55	210 54	1516 59	120 75
Adjala	.....	.....	‡103 00	29 75	16 50	.....	.....	.....	.....	10 25	69 79	218 64	75 86
Albion	120 88	.....	31 00	.....	.....	.....	.....	.....	.....	.....	.....	151 88	.....
Tecumseth	.....	.....	.....	.....	.....	.....	.....	.....	302 19	.....	.....	.....	120 75
Caledon	.....	.....	205 00	195 00	121 20	.....	.....	.....	.....	.....	105 00	626 20	83 80
Carleton:	.....	420 00	424 50	176 50	245 25	.....	.....	.....	.....	348 16	250 57	1862 98	204 36
Fitzroy	1 00	.....	§112 72	111 00	43 75	.....	.....	.....	.....	7 08	46 82	186 04	.....
Gower, North	.....	.....	‖193 85	.....	.....	.....	.....	.....	.....	.....	30 50	224 35	13 97
Huntley	.....	.....	158 60	55 55	49 80	.....	.....	.....	.....	2 50	21 40	287 85	3 15
March	.....	.....	120 80	53 35	.....	.....	.....	.....	.....	.....	22 00	196 15	3 27
Cornwall, E. D.	.....	.....	223 75	53 25	116 25	.....	.....	.....	.....	266 61	53 75	713 61	103 64

* $201.50 unpaid. † Less $261.57 retained, as per By-law. ‡ $10.65 unpaid. ‖ $136.33 less, as per By-law. § Not classified.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Dufferin:	102 92	683 50	700 00	200 00	830 80	4438 70			61 95	7017 87	
Melancthon	92 64	162 00	140 00	120 00	220 13				44 10	778 87	
Dundas:	54 71	393 00	700 00		336 65				1 50	1485 56	
Matilda	58 82	207 50	140 00		132 75					539 07	
Williamsburg	42 45	162 00	112 80		133 40					450 65	
Winchester	69 27	269 00	140 00		159 25	225 00			15 00	877 52	163 22
Durham, East:		156 00	700 00		200 10					1056 10	
Cavan	88 00	76 00	140 00		18 00					322 00	
Manvers	29 54	99 00	140 00	30 00	94 40					392 94	
Hope	34 80	96 00	140 00						34 00	304 80	
Durham, West:	59 80	89 00	700 00		446 46			156 75	8 00	1460 01	152 25
Cartwright	42 52	205 00	140 00		153 45					540 97	
Clarke	150 53	249 50	139 75	72 00					8 50	849 28	
Darlington*		97 00	72 75							169 00	

*United with E. D. Society.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
DUFFERIN:		140 00	429 50	375 00	211 50		2 50			5312 42	438 24	6909 16	108 71
Melancthon			172 75	102 50	126 25					105 36	92 55	599 41	179 46
DUNDAS:		392 80	354 45	65 95	135 55					87 98	166 52	1203 25	282 31
Matilda			115 50	55 50	93 75		19 75			13 95	76 90	375 35	163 72
Williamsburgh			109 75	31 10	63 10					61 57	58 95	324 47	126 18
Winchester			182 30	49 30	50 85					697 88	60 41	1040 74	
DURHAM, EAST:		420 00	366 00	98 50	118 50						44 10	1047 10	9 00
Cavan			*28 00						226 00	68 00		322 00	
Manvers			115 50	58 75	64 50		3 00			40 00	48 79	330 54	62 40
Hope			†34 00							203 36	25 00	274 16	30 64
DURHAM, WEST:		383 55	532 00	282 75	255 00				19 28	24 80	114 88	1612 26	
Cartwright			223 00	84 00	92 75		3 25			20 00	38 77	461 77	79 20
Clarke			271 00	117 25	143 75		2 75			76 00	126 72	737 47	111 81
Darlington									156 75		13 00	169 75	

*Spring Show. †Spring Show.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Elgin, East:*	114 42	166 00	700 00				14 90			995 32	
Southern Exhibition	81 99			600 00	3329 60				1626 64	23 50	5661 13	
Bayham	21 71	105 00	20 86		9 30					7 19	164 06	
Dorchester, South	9 50	209 50	38 66		31 05						288 70	24 55
Malahide		392 00	50 51	50 00	231 65						724 16	
Yarmouth†	35 39	366 00	74 94							92 11	568 44	
St. Thomas Horticultural												
Springfield Horticultural												
Elgin, West:		233 00	700 00		581 87						1514 87	110 52
Aldborough	109 12	160 00	139 25		259 70					11 50	619 57	
Southwold and Dunwich	474 04	219 00	140 00		34 16		721 50				1588 70	
Essex, North:	114 34	176 00	700 00	100 00	176 00						1255 59	
Rochester and Maidstone	197 23	165 00	177 90		37 56						577 38	
Sandwich and Maidstone	372 60	122 50	133 70				12 38				641 18	
Tilbury, West		108 25	108 29		20 30	184 00					420 84	
Essex, South:	202 37	159 00	700 00	100 00	145 30						1306 67	
Colchester, South	197 81	98 75	74 54		173 59		11 66				556 35	
Gosfield	125 56	43 50	26 85				16 00				211 91	
Malden and Anderson	82 40	155 00	96 11	55 00		200 00	111 50		12 55		819 11	
Mersea	265 43	325 50	222 50		214 00		174 25		92 83		1294 51	
Frontenac:	510 18	675 25	700 00	250 00	1837 59				184 96		4151 98	
Kingston		60 00	110 00								170 00	
Storrington	11 08	39 00	110 00								160 08	

* United with Southern Exhibition.

† United with Southern Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for Previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
ELGIN, EAST:		356 76							553 00		11 00	920 76	74 56
Southern Exhibition			1533 00	322 75	870 25					728 35	*2194 14	5657 55	3 58
Bayham			55 11	30 13	10 43		22 33			3 78	35 27	157 05	7 01
Dorchester South			158 25	44 00	36 25					45 00	29 75	313 25	
Malahide	27 00		†241 25	82 85	78 25		7 30			143 64	85 50	632 39	91 77
Yarmouth							120 25		440 94		7 25	568 44	
St. Thomas Horticultural													
Springfield Horticultural													
ELGIN, WEST:		280 00	‡453 85	129 95	230 35		38 15			248 85	268 28	1625 39	
Aldborough			89 93	20 60	12 75		28 84			256 90	89 95	498 97	120 60
Southwold and Dunwich			§119 50	40 50	59 70		4 85	‖441 41		594 80	146 00	1389 01	199 69
ESSEX, NORTH:		419 89	434 80	110 50	64 00		4 50			30 00	139 48	1203 17	52 42
Rochester and Maidstone								373 00		40 88	76 01	489 81	87 57
Sandwich and Maidstone								256 50			11 41	267 91	373 27
Tilbury, West	56 82		91 00	32 00	18 00		4 75			130 00	72 50	405 07	15 77
ESSEX, SOUTH:		420 00	389 25	142 45	107 00						206 35	1265 05	41 62
Colchester, South			47 75	20 00	12 30			100 00		93 45	161 00	434 50	121 85
Gosfield										73 36	44 45	117 81	94 10
Malden and Anderson			165 00	60 00	88 95		6 25	239 75		121 67	88 72	770 34	48 77
Mersea			153 88	75 05	92 25			276 80		16 25	156 09	770 32	524 19
FRONTENAC:		220 00	1041 75	410 67	589 25		15 50			159 48	1094 31	3530 96	627 02
Kingston			70 50	31 50	8 75						29 89	140 64	30 64
Storrington			84 25	23 36	16 11		2 00				21 27	146 98	13 10

* Including $453 for entertaining Lieutenant-Governor, etc., and $181 prizes for games.
†$33.40 unpaid. ‡$45.95 unpaid. §$17.75 unpaid. ‖ For keep of stock.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Grenville, South :	.....	179 00	700 00	100 00	29 88	.....	.....	.....	39 00	1309 88	.....
Edwardsburg	73 37	76 74	140 00	20 00	63 48	.....	.....	.....	.....	373 59	.....
Glengarry :	.....	395 40	700 00	.....	200 00	.....	.....	.....	7 50	1392 90	.....
Lochiel and Kenyon	0 83	69 00	140 00	.....	.....	.....	.....	.....	.....	209 83	.....
Grey, North :	223 94	187 00	700 00	244 00	142 15	.....	.....	.....	.....	1497 09	.....
Derby	38 55	114 75	62 40	30 00	25 95	.....	.....	.....	.....	271 65	.....
Keppel	32 46	85 00	54 20	12 00	.....	.....	.....	.....	.....	183 66	.....
Sullivan	14 39	71 00	41 60	30 00	5 50	.....	.....	.....	.....	165 49	.....
Sydenham	66 80	216 00	150 00	25 00	13 74	.....	.....	.....	.....	471 54	.....
St. Vincent	7 09	183 50	97 50	25 00	54 60	.....	.....	.....	.....	367 69	.....
Sarawak	.....	70 00	38 90	10 00	3 90	.....	.....	.....	6 00	128 80	.....
Owen Sound Horticultural	150 98	163 50	92 00	.....	70 00	.....	.....	.....	5 10	482 33	.....
Grey, South :	192 04	388 25	700 00	300 00	361 38	.....	.....	.....	.....	1941 67	.....
Bentinck	6 77	55 00	77 96	20 00	.....	.....	.....	.....	.....	159 73	.....
Egremont	108 63	141 50	126 02	36 00	.....	.....	.....	.....	.....	412 17	.....
Glenelg	124 50	96 00	93 33	46 67	16 00	.....	.....	.....	.....	376 50	.....
Normanby	40 73	170 00	140 00	75 00	20 00	.....	.....	.....	25 25	470 98	.....
Grey, East :	.....	153 50	700 00	200 00	216 99	.....	.....	30 00	24 65	1325 14	.....
Artemesia *	10 58	14 00	10 75	3 10	.....	.....	.....	.....	.....	38 43	.....
Euphrasia	51 60	146 25	144 10	50 60	63 72	350 00	.....	.....	92 00	897 61	.....
Collingwood	51 61	215 50	99 80	78 50	148 10	.....	.....	.....	1 50	595 01	.....
Holland	8 13	125 00	95 20	27 20	.....	.....	.....	.....	.....	255 53	15 57
Osprey	.....	72 50	59 30	.....	.....	.....	.....	.....	.....	131 80	7 35
Proton	179 24	74 00	56 05	16 00	9 80	.....	.....	.....	.....	335 09	.....

* United with E. D. Society for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1851.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Grenville, South:	2 48	140 00	258 00	188 00	140 00	.....	5 97	.....	.....	111 60	459 00	1296 05	13 83
Edwardsburg	.....	.....	103 00	120 50	41 25	.....	.....	.....	.....	.....	56 46	321 21	52 38
Glengarry:	87 51	140 90	463 59	149 50	172 94	.....	9 09	.....	.....	106 40	221 11	1350 14	42 76
Lochiel and Kenyon	.....	.....	94 51	68 79	18 16	.....	.....	.....	.....	.....	28 00	209 46	37
Grey, North:	.....	420 00	233 05	251 25	64 50	.....	36 25	.....	.....	128 05	165 00	1298 10	198 99
Derby	.....	.....	75 50	50 00	24 50	17 00	.....	.....	.....	.....	53 87	220 87	50 78
Keppel	.....	.....	67 25	45 12	21 00	.....	.....	.....	.....	3 00	40 50	176 87	6 79
Sullivan	.....	.....	51 25	51 00	27 00	.....	.....	.....	.....	.....	15 88	145 13	20 36
Sydenham	.....	.....	*141 25	117 75	44 50	.....	8 75	.....	.....	23 06	34 46	350 77	120 77
St. Vincent	.....	.....	143 00	42 00	47 25	31 00	30 00	.....	.....	19 23	34 08	346 56	21 13
Sarawak	.....	.....	38 85	25 70	7 30	.....	.....	.....	.....	1 50	18 50	91 85	36 95
Owen Sound Horticultural	.....	.....	.....	168 00	32 00	.....	.....	.....	.....	3 50	120 63	324 13	75 48
Grey, South:	.....	420 00	306 00	170 50	159 50	.....	2 75	.....	.....	272 75	†546 97	1878 47	63 20
Bentinck	.....	.....	65 25	31 00	9 25	.....	.....	.....	.....	.....	44 40	149 90	9 83
Egremont	.....	.....	113 25	46 75	53 50	.....	.....	.....	.....	2 00	50 25	265 75	146 42
Glenelg	.....	.....	69 00	58 50	42 50	.....	1 75	.....	.....	14 00	77 20	262 95	113 55
Normanby	.....	.....	127 00	76 75	93 00	.....	2 00	.....	.....	6 00	91 28	396 03	74 95
Grey, East:	67 72	420 00	256 50	161 50	57 00	.....	.....	.....	.....	178 03	‡264 45	1405 20	.....
Artemesia	.....	.....	.....	.....	.....	.....	.....	.....	30 00	.....	1 45	31 45	6 98
Euphrasia	.....	.....	115 25	59 25	60 25	71 00	.....	.....	.....	333 00	137 23	775 97	121 70
Collingwood	.....	.....	179 75	69 50	103 50	36 00	.....	.....	.....	5 50	90 68	484 93	110 08
Holland	.....	.....	96 00	94 25	42 00	.....	.....	.....	.....	.....	38 85	271 10	.....
Osprey	9 13	.....	53 75	24 75	21 00	.....	.....	.....	.....	.....	30 52	139 15	.....
Proton	.....	.....	68 25	44 25	36 50	.....	.....	.....	.....	14 18	94 20	257 38	77 71

* $19 of prizes unpaid. †$120, County Grant to Township Societies. ‡$120, Municipal Grant to Township Societies.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
HALTON:	.....	414 50	700 00	200 00	571 80	600 00	.....	.....	.....	2486 30	166 05
Esquesing	81 78	396 00	112 56	50 00	195 00	.....	.....	.....	.....	835 34	.....
Nassagaweya	.....	252 00	105 43	.....	14 05	.....	.....	.....	9 29	380 77	.....
Nelson	20 08	228 25	96 60	50 50	34 60	.....	.....	.....	.....	430 03	37 47
Trafalgar	116 76	300 00	106 26	.....	182 00	.....	.....	.....	.....	705 02	.....
HALDIMAND:	147 96	177 25	700 00	45 00	142 40	.....	.....	.....	.....	1212 61	.....
Cayuga, North	.....	110 00	67 47	45 00	7 85	.....	.....	.....	.....	230 32	.....
Dunn and Cayuga, South	11 53	103 60	49 23	25 00	15 50	.....	.....	.....	.....	204 86	.....
Rainham	12 42	125 50	62 25	.....	.....	.....	.....	.....	259 09	575 01	.....
Seneca and Oneida	.....	194 00	115 50	50 00	39 92	.....	.....	.....	.....	399 42	197 68
Walpole	43 53	230 00	125 80	25 00	42 75	.....	.....	.....	.....	467 08	.....
HAMILTON, E. D.:	*817 92	807 00	350 00	400 00	.....	.....	.....	.....	†436 35	2811 27	.....
Central Fair	.....	742 00	.....	.....	4579 18	.....	.....	5061 00	13 00	10395 18	.....
HASTINGS, NORTH:	66 87	86 00	681 00	.....	.....	.....	.....	.....	.....	833 87	.....
Dungannon and Faraday	22 35	54 00	80 00	.....	.....	.....	.....	.....	.....	156 60	.....
Tudor and Limerick	16 40	48 00	80 00	.....	.....	.....	.....	.....	.....	144 40	.....
Rawdon	.....	77 00	100 00	.....	.....	.....	.....	.....	46 37	223 37	.....

* United with Central Fair.

†$417 from Central Fair.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
HALTON:	105 57	420 00	749 50	217 00	304 25	30 00	35 00			508 78	282 25	2652 35	
Esquesing			285 75	88 25	76 75	56 25					145 89	652 89	182 45
Nassagaweya			165 50	55 25	57 75					6 50	39 26	346 41	34 36
Nelson			300 00	83 00	49 25					3 50	31 75	467 50	
Trafalgar			271 00	93 00	91 75						125 65	581 40	123 62
HALDIMAND:		420 00	426 75	69 00	103 50					13 75	97 66	1130 66	81 95
Cayuga, North			81 25	39 00	67 60		1 40			3 00	30 20	222 45	7 87
Dunn and Cayuga, South			94 60	32 05	12 75						37 74	177 14	27 72
Rainham			*169 40	27 00	27 95		2 75			232 09	34 33	468 92	106 09
Seneca and Oneida			275 25	56 25	51 00					87 89	87 02	597 10	
Walpole			258 25	55 75	73 25					1 00	74 20	462 45	4 63
HAMILTON, E. D.:									2325 00		69 60	2394 60	416 67
Central Fair			3575 00	1450 00	1038 25					1167 70	2290 00	952 04	†874 14
HASTINGS, NORTH:		260 00	188 35	71 35	110 40					1 00	128 75	759 85	74 02
Dungannon and Faraday			46 25	54 50	21 50		50				24 16	146 91	9 69
Tudor and Limerick			60 15	25 95	9 05					18 79	30 32	144 26	14
Rawdon			100 30	29 95	31 50						41 60	225 37	

* $24.70 prizes unpaid.

† Divided among Hamilton, South Wentworth and North Wentworth Societies.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Hastings, East:	78 95	150 00	700 00	.....	.....	.....	50 00	.....	.....	978 95	.....
Hungerford	56 41	66 00	140 00	.....	10 45	.....	.....	.....	.....	272 86	.....
Tyendinaga	35 57	63 00	140 00	.....	.....	.....	.....	.....	.....	238 57	.....
Hastings, West:	215 89	125 00	700 00	.....	303 11	.....	.....	.....	.....	1344 00	.....
Belleville Horticultural	230 41	36 00	150 00	.....	.....	.....	.....	.....	.....	416 41	.....
Huron, East:	49 06	83 00	700 00	100 00	.....	.....	.....	200 00	.....	1132 06	.....
Grey*	61 11	160 00	72 40	11 26	410 64	.....	.....	.....	.....	715 41	.....
Howick	19 12	97 10	44 56	.....	23 84	.....	.....	.....	.....	184 62	.....
Hullett	27 85	269 75	95 90	.....	353 91	.....	.....	.....	.....	747 41	119 43
Morris	119 47	378 00	162 10	.....	.....	.....	.....	.....	.....	659 57	.....
Turnberry	79 06	324 25	137 82	.....	218 00	.....	.....	.....	.....	759 13	.....
Wroxeter Horticultural	.....	132 00	60 65	.....	33 73	.....	.....	.....	.....	226 38	19 68
Huron, West:	40 16	164 80	700 00	100 00	275 75	.....	.....	700 20	.....	1980 91	.....
Ashfield and Wawanosh	55 84	149 00	53 00	7 50	48 20	.....	.....	.....	.....	313 54	.....
Colborne†	.....	155 00	66 30	9 30	.....	.....	.....	.....	.....	230 60	.....
Wawanosh, East	74 08	257 00	85 50	.....	82 70	150 00	.....	.....	.....	649 28	.....
Goderich Horticultural‡	162 59	280 50	108 60	115 50	.....	.....	.....	.....	.....	667 19	.....
Huron, South:	98	152 75	700 00	100 00	.....	.....	.....	900 00	.....	1853 73	.....
Hay	77 22	172 00	61 13	8 75	144 65	.....	.....	.....	.....	463 75	.....
Stanley	5 12	197 50	91 74	.....	59 70	.....	.....	.....	.....	354 06	.....
Stephen and Usborne§	232 15	352 00	140 00	20 33	605 38	.....	.....	.....	.....	1349 86	.....
Tuckersmith	98 22	414 00	136 27	19 47	257 73	.....	.....	.....	.....	925 69	37 36

* United with E. D. Society. † United with E. D. Society. ‡ United with E. D. Society for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibition.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
HASTINGS, EAST:	.....	280 00	112 25	49 10	*53 35	.....	64 60	.....	.....	248 38	116 93	866 11	112 84
Hungerford	.....	.....	96 28	44 35	57 55	.....	31 95	.....	.....	.....	24 40	254 53	18 33
Tyendinaga	.....	.....	72 65	28 95	37 40	.....	.....	.....	.....	26 62	34 00	199 62	38 95
HASTINGS, WEST:	.....	150 00	238 25	25 75	62 75	.....	115 25	.....	.....	489 89	74 25	1156 14	187 86
Belleville Horticultural	.....	.....	.....	150 05	.....	.....	2 00	.....	.....	.....	64 91	216 96	199 45
HURON, EAST:	.....	480 00	†311 50	100 25	125 75	.....	19 50	.....	.....	.....	142 40	1063 40	68 66
Grey‡	.....	.....	.....	.....	.....	.....	43 50	.....	200 00	285 08	28 00	556 58	158 83
Howick	.....	.....	70 25	27 35	27 25	.....	3 70	.....	.....	16 00	21 83	166 38	18 24
Hullett	.....	.....	193 50	57 25	76 00	.....	37 00	.....	.....	367 26	135 83	866 84	.....
Morris	.....	.....	364 45	76 75	82 50	.....	.....	.....	.....	.....	39 25	562 95	96 62
Turnberry	.....	.....	256 50	70 50	136 50	.....	11 00	.....	.....	125 38	127 90	727 78	31 35
Wroxeter Horticultural	22 13	.....	.....	178 40	.....	.....	.....	.....	.....	.....	45 53	246 06	.....
HURON, WEST:	.....	478 05	432 00	346 00	263 50	.....	9 00	.....	.....	23 20	354 29	1906 04	74 87
Ashfield and Wawanosh	.....	.....	81 75	50 75	42 00	.....	9 50	.....	.....	.....	49 11	233 11	80 43
Colborne	.....	.....	.....	.....	.....	.....	.....	.....	195 60	.....	35 00	230 60	.....
Wawanosh, East	.....	.....	204 00	57 75	60 00	.....	9 25	.....	.....	171 00	52 25	554 25	95 03
Goderich Horticultural	.....	.....	.....	.....	.....	.....	.....	.....	504 60	.....	21 24	525 84	141 35
HURON, SOUTH:	.....	417 67	743 50	121 25	212 00	.....	.....	.....	.....	.....	249 48	1743 90	109 83
Hay	.....	.....	218 00	87 30	71 10	.....	29 50	.....	.....	3 11	42 10	451 11	12 64
Stanley	.....	.....	108 50	79 25	60 75	.....	.....	.....	.....	34 66	51 50	334 66	19 40
Stephen and Usborne	.....	.....	§83 00	.....	.....	.....	.....	.....	900 00	185 38	81 62	1250 00	99 86
Tuckersmith	.....	.....	315 00	138 75	90 00	.....	92 80	.....	.....	134 50	192 00	963 05	.....

*$58.50 prizes unpaid. †$116 unpaid. ‡United with E. D. Society. §Spring show.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
KENT, EAST:	598 37	282 00	700 00	250 00	396 46	.....	58 00	.....	57 00	2341 91	.....
Camden and Dresden	.....	252 00	111 92	100 00	237 70	.....	.....	.....	29 00	730 62	53 16
Harwich	72 90	232 50	91 28	.....	229 25	185 40	258 17	.....	.....	1144 50	.....
Howard	.....	238 00	140 00	.....	186 34	.....	.....	.....	77 00	731 34	.....
Orford	6 05	136 00	55 42	.....	193 89	.....	.....	.....	25 90	417 26	.....
KENT, WEST:	1068 20	2720 00	700 00	1510 00	2256 71	110 00	60 00	.....	237 00	8661 91	.....
Chatham and Dover	222 73	158 50	170 47	265 00	160 00	.....	.....	.....	3 50	980 20	64 24
Raleigh	31 03	87 50	90 15	.....	.....	.....	593 50	.....	12 00	814 18	.....
Romney	98 92	121 00	‡225 27	.....	90 51	.....	.....	.....	7 52	54 23	.....
Tilbury, East	95 69	108 00	103 94	.....	22 41	.....	.....	.....	.....	330 04	.....
LAMBTON, EAST:	67 24	367 00	700 00	200 00	266 80	.....	.....	140 00	.....	1741 04	.....
Bosanquet	.....	222 00	140 00	50 00	79 10	.....	.....	.....	.....	491 10	.....
Brooke	146 71	103 00	83 00	.....	.....	.....	.....	.....	.....	332 71	.....
Euphemia and Dawn	.....	96 00	89 50	30 00	38 25	.....	.....	.....	.....	253 75	.....
Plympton*	45 11	337 00	140 00	65 00	.....	75 00	.....	.....	15 20	677 31	.....
LAMBTON, WEST:	.....	177 00	700 00	400 00	202 20	.....	.....	466 29	.....	1945 49	.....
Enniskillen	5 15	182 00	127 70	.....	27 73	.....	.....	.....	50	343 08	.....
Moore	67 79	129 20	88 00	25 00	25 88	.....	.....	.....	9 35	345 22	.....
Sarnia†	69 78	170 00	107 00	100 00	69 47	.....	.....	.....	.....	516 25	.....

* United with E. D. Society for Exhibition. † United with E. D. Society for Exhibition. ‡ For the years 1880 and 1881.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Kent, East:	.....	398 62	439 00	155 00	104 00	.....	97 75	250 00	.....	558 03	211 81	2214 21	127 70
Camden and Dresden	8 21	.....	151 75	63 15	147 85	.....	.....	.....	.....	323 07	89 75	783 78	.....
Harwich	.....	.....	133 00	57 25	63 00	.....	73 50	348 35	.....	178 61	117 68	971 39	173 11
Howard	50 61	.....	241 75	67 60	89 45	.....	.....	.....	.....	.....	185 67	635 03	96 31
Orford	.....	.....	152 10	71 40	20 40	.....	.....	.....	.....	63 04	76 57	383 51	33 75
Kent, West:	.....	420 00	907 00	190 50	717 25	.....	27 00	.....	.....	5381 35	956 06	8599 00	62 75
Chatham and Dover	.....	.....	148 55	54 80	61 75	.....	.....	.....	.....	642 39	136 95	1044 44	.....
Raleigh	.....	.....	108 25	26 10	15 25	.....	.....	546 35	.....	5 00	138 60	739 55	74 63
Romney	.....	.....	.....	.....	.....	.....	.....	.....	.....	423 74	28 65	452 39	90 84
Tilbury, East	.....	.....	90 00	29 85	36 25	.....	.....	140 50	.....	75	27 00	324 25	5 79
Lambton, East:	.....	419 00	382 10	158 55	202 80	.....	5 75	.....	.....	156 60	243 84	1568 64	172 40
Bosanquet	16 90	.....	112 50	56 75	39 00	.....	.....	.....	.....	196 63	42 09	463 87	27 23
Brooke	.....	.....	142 50	43 25	39 10	.....	2 00	.....	.....	18 25	52 50	297 60	35 11
Euphemia and Dawn	1 64	.....	102 00	44 85	42 15	.....	.....	.....	.....	3 00	40 23	233 87	19 88
Plympton	.....	.....	.....	.....	.....	.....	2 00	.....	327 00	266 38	54 75	650 13	27 18
Lambton, West:	73 93	420 00	457 98	165 65	110 92	.....	26 87	.....	69 47	262 65	264 31	1851 78	93 71
Enniskillen	.....	136 45	50 90	48 95	.....	.....	8 50	.....	.....	3 75	84 92	333 47	9 61
Moore	.....	.....	142 70	45 42	13 60	.....	.....	.....	.....	7 50	86 17	296 39	48 83
Sarnia	.....	.....	.....	.....	.....	.....	7 00	.....	216 00	192 64	25 00	440 64	75 61

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
LANARK, NORTH:	300 05	299 75	700 00	75 00	677 41	1350 00				3402 21	
Dalhousie	58 97	99 40	140 00				187 55			485 92	
Lanark	175 20	141 00	140 00		42 62		379 19			878 01	
Pakenham	5 73	155 09	140 00	25 00						325 82	
LANARK, SOUTH:		257 50	700 00		250 00					1207 60	159 76
Drummond	9 29	61 50	140 00				73 00		8 00	291 79	
Montague	19 43	166 75	140 00		45 70		56 65			428 53	
LENNOX:		270 00	700 00		800 71					1770 71	
Amherst Island	66 55	55 00	140 00							261 65	
Ernestown	12 69	56 50								284 69	
LEEDS, SOUTH:		213 05	700 00	100 00	300 10				72 60	1385 75	228 52
Bastard and Crosby	15 99	136 00	100 00	14 36	91 90				41 64	399 89	
Crosby, North	23 03	197 70	109 00	15 37	70 64	130 00			43 85	589 59	239 95
Lansdowne		174 00	140 00	21 00	190 13		8 50		2 60	536 23	
Rear of Leeds and Lansdowne	29 67	75 60	55 00	32 50	79 35					271 52	
LEEDS, NORTH, AND GRENVILLE:	132 13	188 66	700 00	100 00	173 00				81 10	1374 89	
Elmsley, South	14 99	89 50	92 24		105 20					301 93	
Kitley	41 89	38 00	152 74		118 30				25 00	375 13	1 69
Oxford	5 54	73 64	89 91	10 00	19 30					198 39	
Wolford		129 81	144 04	50 00	38 34					362 19	

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
LANARK, NORTH:		*420 00	395 25	172 00	198 00			51 25		1463 19	†524 28	3127 52	274 69
Dalhousie			66 25	51 20	33 35			223 57		11 00	43 75	429 12	56 80
Lanark			72 60	47 85	55 70			436 24		14 50	58 14	685 03	192 98
Pakenham			80 00	75 05	51 25						111 07	317 37	8 45
LANARK, SOUTH:	186 55	280 00	280 25	139 50	136 25					178 17	166 64	1367 36	
Drummond								247 40		5 00	33 60	286 00	5 79
Montague			104 25	81*25	87 00			45 32		9 75	94 50	422 07	6 46
LENNOX:	105 89	280 00	741 25	84 70	251 27		61 10			11 00	234 50	1769 71	1 00
Amherst Island			101 90	60 10	26 20						12 35	200 35	61 19
Ernestown			47 80	17 00	23 50		10 55	109 50			39 22	247 57	37 12
LEEDS, SOUTH:	65 89	462 40	321 00	122 00	250 20		9 30			92 06	293 42	1614 27	
Bastard and Crosby			178 00	83 80	18 90					38 46	69 00	338 16	11 73
Crosby, North			180 75	109 00	117 75					243 58	178 46	829 54	
Lansdowne	22		114 00	47 43	73 35			57 90		7 44	86 29	386 63	149 60
Rear of Leeds and Lansdowne			85 00	53 60	36 70					27 60	67 07	269 97	1 55
LEEDS, NORTH, AND GRENVILLE:		486 90	154 00	139 00	83 99		6 35			87 49	279 16	1236 89	138 00
Elmsley, South			53 00	27 35	27 26					40 50	40 57	188 68	113 25
Kitley			153 00	55 00	46 13		2 68			46 81	74 00	377 62	
Oxford			56 50	27 20	35 85		27 00			14 20	30 00	190 75	7 64
Wolford			82 00	63 15	8 65		20 76			84 72	38 33	298 11	64 08

*$96.25 less paid, as per discount. †$325 loan paid.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Lincoln:	.....	558 50	700 00	560 00	507 00	353 45	.....	.....	12 85	2691 80	.....
Clinton	.....	271 50	80 56	125 00	80 00	.....	.....	.....	.....	557 06	.....
Grantham	37 79	340 00	129 20	60 00	.....	.....	.....	.....	.....	566 99	.....
Grimsby	.....	375 50	140 00	150 00	374 00	.....	.....	.....	258 50	1298 00	.....
Louth	23 23	129 00	68 40	75 00	.....	.....	.....	.....	.....	295 63	.....
London, E. D.:	770 17	144 00	350 00	.....	.....	.....	.....	.....	31 91	1296 08	.....
Western Exhibition*	5889 26	.....	.....	.....	.....	.....	.....	.....	†242 91	6132 17	.....
Middlesex, East ‡	1 89	229 00	700 00	.....	.....	.....	.....	.....	281 42	1212 31	.....
Dorchester, North	.....	233 35	84 37	.....	.....	.....	.....	.....	20 00	337 62	.....
London	135 69	186 00	128 26	20 00	.....	.....	.....	.....	43 75	513 70	.....
Nissouri, West	81 16	125 00	67 37	.....	.....	.....	.....	.....	.....	273 53	.....
Westminster	4 96	294 50	140 00	.....	.....	.....	.....	.....	.....	439 46	.....
Middlesex, West:	24 26	394 25	700 00	.....	362 50	.....	.....	.....	.....	1481 01	.....
Caradoc	50 76	168 50	77 27	.....	19 38	.....	.....	.....	5 75	321 66	.....
Delaware	54 04	219 00	107 25	.....	.....	.....	.....	.....	38 00	418 29	.....
Ekfrid	23 14	109 75	48 25	.....	.....	.....	.....	.....	.....	181 14	.....
Metcalfe	34 64	95 00	41 25	.....	.....	.....	.....	.....	.....	170 89	.....
Mosa	30 12	174 75	78 21	.....	284 40	.....	.....	.....	.....	567 48	.....
Strathroy Horticultural	38 04	95 00	51 50	.....	84 61	.....	.....	.....	.....	268 80	.....

* No Western Exhibition, as the Provincial was held in London. † $224.41 for Bank interest. ‡ United with Provincial Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
LINCOLN:	19 07	288 96	.....	.....	.....	.....	4 50	.....	.....	362 49	*1150 25	2674 72	17 08
Clinton	.....	.....	255 00	76 26	55 00	.....	1 00	.....	.....	33 13	39 58	535 32	21 74
Grantham†	.....	.....	.....	.....	.....	.....	.....	.....	529 20	.....	.....	529 20	37 79
Grimsby	.....	.....	393 00	109 95	105 05	.....	.....	.....	.....	486 99	175 32	1295 94	2 06
Louth	.....	.....	141 50	38 25	25 50	.....	.....	.....	.....	1 25	43 85	250 35	45 28
LONDON, E. D.:	.....	.....	.....	.....	.....	.....	.....	.....	‡134 00	73 00	88 50	295 50	1000 58
Western Exhibition	.....	.....	.....	.....	.....	.....	6 00	.....	.....	116 50	152 50	275 00	5857 17
MIDDLESEX, EAST:	.....	420 00	.....	.....	.....	.....	.....	.....	233 00	.....	227 20	880 20	332 11
Dorchester, North	14 35	.....	177 00	48 25	18 25	.....	.....	.....	.....	.....	35 76	293 61	44 01
London	.....	.....	242 25	32 25	44 25	.....	41 25	.....	.....	6 48	108 10	485 58	28 12
Nissouri, West	.....	.....	100 50	26 40	35 45	.....	.....	.....	.....	.....	62 63	224 98	48 55
Westminster	.....	.....	340 50	27 75	32 50	.....	.....	.....	.....	.....	27 93	428 68	10 78
MIDDLESEX, WEST:	.....	403 55	385 15	93 50	124 90	.....	24 95	.....	.....	77 00	289 35	1398 40	82 61
Caradoc	.....	.....	§219 80	49 20	39 30	.....	5 00	.....	.....	1 00	55 15	276 00	45 66
Delaware	.....	.....	187 50	48 65	27 25	.....	.....	.....	.....	.....	50 20	313 60	104 69
Ekfrid	.....	.....	81 75	32 00	15 25	.....	.....	.....	.....	.....	28 77	157 77	23 37
Metcalfe	.....	.....	71 35	24 60	9 00	.....	.....	.....	.....	36 15	.....	141 10	29 79
Mosa	.....	.....	128 00	45 00	45 25	.....	.....	.....	.....	228 54	44 50	491 29	76 19
Strathroy Horticultural	.....	.....	.....	73 30	.....	.....	.....	.....	.....	59 24	118 86	251 40	17 40

*$691.46 paid note and interest. †United with E. D. Society for Exhibition. ‡To Provincial Exhibition. §93.45 of prizes unpaid.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Middlesex, North:	66 40	624 00	700 00		326 08					1716 48	239 17
Adelaide		80 00	47 00						19 05	146 05	10 71
Biddulph	96 59	94 00	57 50							248 09	
Lobo*		65 00	53 50							118 50	
McGillivray	0 76	75 03	39 00						18 00	132 79	
Williams, East		134 00	83 00							217 00	
Williams, West		251 00	140 00		100 20					491 20	
Monck:	10 44	207 00	700 00		150 00				75 25	1142 69	
Canborough	19 86	64 00	51 00	25 00	3 25				4 00	167 11	
Caistor	19 00	65 00	50 40	33 00	3 50				10 00	180 90	
Gainsborough	1 99	66 50	51 20	50 00	3 20					172 89	1 11
Western Branch		214 75	140 00	70 00	45 00				9 00	478 75	
Pelham	36 52	121 00	84 00	11 42	29 70	74 62				357 26	
Wainfleet		53 00	42 40	30 00	10 75					136 15	
Muskoka:	177 88	121 00	700 00	100 00	119 66	300 00				1518 54	
Foley	27 91	35 50	45 90		3 75					113 06	
Humphrey and Cardwell	22 71	64 00	44 20							130 91	
Morrison and Ryde	3 93	82 50	57 80		12 05					156 28	
Stephenson	22 70	60 00	44 20		6 20					133 10	
McDougall and Carling	4 37	68 25	50 15	15 00	10 85					148 62	
McKellar and Hagerman	0 94	73 25	51 00		16 80					141 99	
McLean and Ridout	1 61	46 50	25 50		4 25					77 86	
Medora and Wood	11 25	68 80	51 00		3 15				8 50	142 70	
Watt	5 43	88 50	48 45	5 00	2 10					149 48	

* United with E. D. Society for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Middlesex, North:	.....	420 00	540 75	158 51	159 70	.....	79 75	.....	.....	240 89	356 05	1955 65	.....
Adelaide	19 76	.....	*109 75	.....	.....	.....	.....	.....	.....	.....	27 25	156 76	.....
Biddulph	.....	.....	103 80	18 25	25 60	.....	.....	.....	.....	6 20	18 64	171 89	76 20
Lobo	.....	.....	.....	.....	.....	.....	.....	.....	108 50	.....	10 00	118 50	.....
McGillivray	.....	.....	80 00	18 25	22 00	.....	.....	.....	.....	.....	12 50	132 75	04
Williams, East†	.....	.....	.....	.....	.....	.....	.....	.....	207 00	.....	10 00	217 00	.....
Williams, West	10 98	.....	175 00	50 00	86 50	.....	6 50	.....	.....	7 79	66 00	402 77	88 43
Monck:	.....	420 00	308 43	135 50	68 41	.....	.....	.....	.....	70 00	109 60	1111 94	30 75
Canborough	.....	.....	93 35	36 75	13 60	.....	.....	.....	.....	1 21	16 50	161 41	5 70
Caistor	.....	.....	82 75	14 80	31 75	.....	.....	.....	.....	.....	39 23	168 53	12 37
Gainsborough	.....	.....	89 25	31 70	13 69	.....	.....	.....	.....	10 00	29 36	174 00	.....
Western Branch	.....	.....	220 50	48 00	93 50	.....	.....	.....	.....	.....	69 16	431 16	47 59
Pelham	.....	.....	161 97	53 39	30 01	.....	31 84	.....	.....	.....	56 91	334 12	23 14
Wainfleet	4 45	.....	88 05	15 20	14 25	.....	.....	.....	.....	.....	11 00	132 95	3 20
Muskoka:	.....	418 20	185 25	102 00	69 25	.....	.....	.....	.....	459 36	155 07	1389 13	129 41
Foley	.....	.....	39 75	31 50	10 50	.....	.....	.....	.....	.....	17 02	98 77	14 29
Humphrey and Cardwell	.....	.....	60 25	32 75	12 75	.....	.....	.....	.....	1 98	18 43	126 16	4 75
Morrison and Ryde	.....	.....	73 75	23 10	11 65	.....	.....	.....	.....	.....	.....	128 82	27 46
Stephenson	.....	.....	53 35	39 50	6 00	.....	.....	.....	.....	.....	23 51	121 36	11 74
McDougall and Carling	.....	.....	50 25	39 25	18 75	.....	.....	.....	.....	10 00	22 25	140 50	8 12
McKellar and Hagerman	.....	.....	42 75	33 75	28 50	.....	6 99	.....	.....	.....	22 40	134 39	7 60
McLean and Ridout	.....	.....	27 55	27 22	6 32	.....	.....	.....	.....	.....	13 07	74 16	3 70
Medora and Wood	.....	.....	27 25	18 25	4 75	.....	.....	.....	.....	61 14	5 23	116 62	26 08
Watt	.....	.....	73 50	33 50	13 55	.....	.....	.....	.....	.....	11 50	132 30	17 18

* Prizes not classified. † United with E. D. Society.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
NIAGARA, E. D.:	86 67	174 00	350 00	130 00	22 60	.....	.....	.....	25 00	761 27	.....
NORFOLK, NORTH:	568 62	282 50	700 00	.....	984 35	.....	.....	550 00	20 83	3106 30	.....
Middleton	164 61	256 00	140 00	.....	135 35	.....	.....	.....	.....	695 96	.....
Townsend	61 55	342 50	140 00	300 00	348 35	800 00	*1405 71	.....	4 90	3403 01	.....
Windham	70 20	149 00	94 50	.....	46 85	.....	.....	.....	.....	360 55	.....
NORFOLK, SOUTH:†	897 44	163 00	700 00	.....	.....	.....	.....	.....	35 14	1795 58	.....
Charlotteville	65 49	104 00	104 00	.....	95 51	.....	.....	.....	.....	369 00	.....
Houghton	13 41	81 00	81 00	.....	.....	.....	.....	.....	.....	175 41	.....
Walsingham	87 25	177 00	140 00	.....	175 29	.....	.....	.....	.....	579 54	.....
Woodhouse	12 02	110 00	110 00	200 00	50 00	500 00	.....	.....	54 90	1036 92	.....
NORTHUMBERLAND, EAST:	.....	99 00	700 00	.....	22 00	.....	.....	.....	.....	821 00	8 30
Brighton	113 71	70 00	25 00	68 95	.....	.....	.....	.....	.....	277 66	.....
Cramahe	.....	116 00	112 25	.....	26 00	.....	.....	.....	5 22	254 25	5 22
Murray	.....	100 00	94 00	.....	71 60	.....	.....	.....	.....	265 60	.....
Percy‡	120 29	79 00	215 45	.....	.....	.....	.....	.....	.....	414 74	.....
Seymour	26 34	76 00	67 00	.....	8 99	.....	.....	.....	.....	178 33	.....
NORTHUMBERLAND, WEST:	4 44	223 00	700 00	.....	509 45	.....	.....	200 00	24 50	1661 64	.....
Alnwick	51 84	57 00	70 37	.....	141 00	.....	.....	.....	.....	320 21	.....
Haldimand	163 49	70 00	87 63	.....	25 08	.....	.....	.....	.....	346 20	.....
Hamilton§	16 57	122 00	140 00	.....	.....	.....	.....	.....	.....	278 57	.....

* Proceeds of sale of Exhibition Grounds.
‡ United with E. D. Society for Exhibition.
† United with N. Norfolk Society for Exhibition.
§ United with E. D. Society for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
NIAGARA, E. D.:	.....	.....	261 00	199 00	58 25	.....	.....	.....	.....	33 70	135 00	686 95	74 32
NORFOLK, NORTH:	.....	374 50	584 80	185 75	199 25	.....	.....	100 00	.....	896 37	415 65	2756 32	349 98
Middleton	.....	.....	236 00	85 45	87 58	.....	.....	.....	.....	5 50	116 99	531 52	164 44
Townsend	.....	.....	304 75	77 80	81 50	.....	.....	.....	.....	2580 27	205 68	3250 00	153 01
Windham	.....	.....	141 50	53 00	48 75	.....	27 00	.....	.....	4 25	27 70	302 20	58 35
NORFOLK, SOUTH:	.....	435 00	.....	.....	.....	.....	.....	.....	663 96	.....	165 96	1264 92	530 66
Charlotteville	.....	.....	120 35	60 35	21 65	.....	.....	.....	.....	8 87	51 50	262 72	106 28
Houghton	.....	.....	65 25	27 20	9 40	.....	.....	.....	.....	.....	25 37	127 22	48 19
Walsingham	.....	.....	174 30	73 60	59 10	.....	36 95	.....	.....	60 00	93 67	496 62	82 92
Woodhouse	.....	.....	*154 86	.....	.....	.....	.....	.....	.....	807 51	23 18	985 55	51 37
NORTHUMBERLAND, EAST:	18 81	342 74	232 55	77 10	99 75	.....	.....	.....	.....	.....	58 35	829 30	.....
Brighton	.....	.....	88 50	34 32	51 09	.....	.....	.....	.....	.....	47 10	221 09	56 57
Cramahe	30 62	.....	62 25	16 75	31 25	.....	.....	.....	.....	3 55	115 05	259 47	.....
Murray	5 12	.....	100 23	59 80	35 95	.....	.....	.....	.....	.....	49 20	250 30	15 30
Percy	.....	.....	.....	.....	.....	.....	.....	.....	20 00	318 95	46 64	385 59	29 15
Seymour	.....	.....	†30 90	21 25	12 20	.....	50	.....	.....	2 50	67 62	119 22	59 11
NORTHUMBERLAND, WEST:	.....	298 00	293 50	172 50	151 87	.....	.....	.....	.....	508 00	157 25	1581 15	80 49
Alnwick	.....	.....	106 77	43 77	31 65	.....	.....	.....	.....	1 00	45 51	228 70	91 51
Haldimand	.....	.....	85 38	49 65	43 00	.....	.....	.....	.....	.....	53 27	233 27	112 93
Hamilton	.....	.....	.....	.....	.....	.....	.....	.....	200 00	.....	20 85	220 85	57 72

* Prizes not classified. †$15.75 unpaid.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Ontario, North:	247 82	226 00	700 00	.....	311 39	.....	.....	.....	12 40	1497 61	.....
Brock	.....	146 00	88 39	.....	76 87	.....	.....	.....	39 25	350 51	18 72
Mara and Rama	.....	117 00	62 10	.....	.....	.....	.....	.....	8 00	187 10	6 15
Reach and Scugog	55 22	201 00	89 00	.....	129 39	.....	.....	.....	.....	474 61	.....
Scott	54 20	126 00	56 72	.....	43 10	.....	.....	.....	.....	280 02	.....
Thorah	71 74	84 00	44 75	39 15	.....	.....	.....	.....	3 00	242 64	.....
Uxbridge	129 69	142 00	81 21	.....	121 21	.....	.....	.....	66 50	540 61	.....
Ontario, South:	42 20	861 60	700 00	.....	1026 45	.....	.....	.....	.....	2630 25	.....
Pickering	.....	197 00	140 00	.....	364 50	.....	.....	.....	41 00	742 50	.....
Whitby and Whitby, East	74 53	259 00	140 00	.....	81 09	.....	.....	.....	18 00	572 62	.....
Ottawa, E. D.:	.....	404 00	350 00	900 00	1319 80	.....	.....	.....	.....	2973 80	.....
Oxford, North:	68 50	597 00	700 00	.....	790 91	.....	.....	177 05	.....	2333 46	.....
Blenheim	30 54	333 00	140 00	.....	272 35	.....	.....	.....	226 75	1002 64	.....
Blandford	.....	105 00	72 05	.....	.....	.....	.....	.....	.....	177 05	.....
Nissouri, East	28 41	202 00	80 29	.....	.....	.....	.....	.....	.....	310 70	.....
Zorra, East	19 84	105 00	41 86	25 00	27 25	.....	.....	140 00	36 50	395 42	.....
Zorra, West	68 99	240 50	85 76	30 00	17 75	.....	.....	.....	.....	443 00	.....

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Ontario, North:		420 00	315 00	115 75	268 50		1 75			65 25	216 43	1376 43	121 18
Brock	7 28		152 00	64 25	103 75					2 00	39 95	369 23	
Mara and Rama	3 10		103 75	39 50	15 50		1 50			1 10	28 80	193 25	
Reach and Scugog			*262 50	45 00	122 25		16 50				159 21	469 96	4 65
Scott			96 00	43 75	19 75		13 75				51 49	224 74	55 28
Thora			36 25	21 75	16 21					33 50	53 30	161 01	81 63
Uxbridge			124 75	97 25	89 00		21 50			20 00	92 54	445 04	95 57
Ontario, South:		280 00	850 00	349 00	487 25		9 00				606 28	2581 53	48 72
Pickering			242 00	136 00	169 50					56 70	83 97	687 47	55 03
Whitby and Whitby, East			247 75	134 50	119 75						66 22	568 22	4 40
Ottawa, E. D.:	174 61		728 00	511 00	113 00					559 99	872 82	2959 42	14 38
Oxford, North:		449 98	994 50	203 00	140 00					114 25	394 01	2265 74	67 72
Blenheim			377 50	149 25	91 50		43 50				208 69	861 44	141 20
Blandford†									177 05			177 05	
Nissouri, East			201 50	28 25	28 50						36 85	293 10	17 60
Zorra, East			173 25	62 75	46 75					16 00	61 00	359 75	35 67
Zorra, West			95 00	41 25	40 50		13 50			14 25	105 02	309 52	133 48

*$145.50 unpaid. †United with E. D. Society for Exhibition

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Oxford, South:	16 67	353 75	700 00	.....	.....	.....	.....	581 70	65 09	1717 21	.....
Dereham	4 94	283 00	98 30	.....	137 38	.....	.....	.....	22 00	545 62	0 63
Norwich, North	.....	472 50	140 00	.....	127 45	.....	.....	.....	154 97	894 92	.....
Norwich, South	169 92	389 00	129 10	.....	514 00	.....	.....	.....	57 58	1259 60	.....
Oxford, East*	90 70	71 00	28 68	.....	.....	.....	.....	.....	13 62	204 00	.....
Peel:	.....	527 00	700 00	350 00	1643 78	.....	.....	.....	.....	3220 78	.....
Toronto	563 37	186 00	140 00	100 00	224 66	.....	.....	.....	29 66	1237 69	.....
Perth, North:	237 47	310 00	700 00	150 00	558 50	.....	.....	.....	160 00	2251 62	.....
Elma	49 86	112 00	90 00	.....	45 45	.....	.....	.....	1 50	315 36	.....
Logan	18 92	83 00	68 00	20 00	19 80	.....	.....	.....	3 74	213 46	.....
Mornington	.....	136 00	86 00	20 00	30 40	.....	.....	.....	.....	272 40	.....
Wallace and Elma	19 15	330 00	170 00	125 00	419 50	.....	.....	.....	.....	1063 65	.....
Stratford Horticultural	466 75	116 00	96 00	.....	64 70	.....	.....	.....	.....	743 45	.....
Perth, South:	131 15	183 00	700 00	270 00	612 68	.....	.....	.....	7 00	1903 83	.....
Blanshard	100 20	190 00	105 20	56 00	30 00	.....	.....	.....	2 00	483 40	.....
Fullarton	42 92	51 00	53 00	.....	18 00	.....	.....	.....	.....	164 92	.....
Hibbert	25 59	142 00	105 28	25 00	102 25	.....	.....	.....	.....	400 12	26 27
Easthope, South	15 92	85 00	49 28	12 00	.....	.....	.....	.....	.....	162 20	.....
Mitchell Horticultural	.....	201 00	150 09	50 00	.....	.....	.....	.....	.....	401 09	15 81
St. Mary's Horticultural	29 00	33 00	26 14	40 00	.....	.....	.....	.....	.....	128 14	.....

* United with S. Norwich for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Oxford, South		396 08	720 50	197 00	145 75		27 00				144 18	1630 51	86 70
Dereham			159 50	65 00	45 00					117 35	159 40	546 25	
Norwich, North	96 75		338 50	80 05	72 00					56 11	116 62	760 03	134 89
Norwich, South			*642 75				42 00			52 20	221 70	958 65	300 95
Oxford, East									71 00		12 40	83 40	120 60
Peel	22 65	140 00	1017 00	427 00	512 00		79 00			230 29	545 47	2973 41	247 37
Toronto			326 00	82 50	78 50					135 77	136 25	759 02	478 67
Perth, North		510 00	422 75	315 25	192 00		50 00			265 09	392 38	2147 47	104 15
Elma			83 50	41 61	16 75		52 25			2 10	88 35	284 56	30 80
Logan			105 75	34 50	25 75						38 12	204 12	9 34
Mornington			109 00	39 75	42 75						16 70	208 20	64 20
Wallace and Elma			395 50	148 25	130 75		76 56				256 75	1007 85	55 84
Stratford Horticultural				110 00			15 90		30 00	10 75	84 45	251 10	492 35
Perth, South		510 00	346 70	52 90	151 35		13 45			294 81	252 06	1621 27	282 56
Blanshard			151 75	42 00	77 00		79 00			5 00	77 73	432 48	50 92
Fullarton			62 50	27 50	28 75		16 25				22 50	157 50	7 40
Hibbert			150 25	33 80	54 00		50 05			83 79	54 50	426 39	
Easthope, South†									140 00			140 00	22 20
Mitchell Horticultural	10 23			169 00						131 20	108 47	416 09	
St. Mary's Horticultural				70 80							10 00	80 80	47 34

*Amount to E. D. Society for Exhibition, etc.

† United with East Zorra Society for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Peterborough, East:		81 00	700 00		193 77			100 00		1074 77	
Asphodel and Belmont	3 21	64 00	105 00	15 00	83 00					270 21	
Douro and Dummer	78 13	83 00	109 09				19 50		6 00	295 72	
Burleigh		70 00	94 09		10 00				2 38	176 47	
Otonabee	159 38	58 00	111 82							329 25	
Peterborough, West:	208 94	94 00	700 00		137 43				6 25	1146 62	
Monaghan, South		50 00	140 00		19 47					209 47	
Smith and Ennismore	139 71	110 50	140 00		96 45				7 59	494 25	
Peterborough Horticultural	164 36	67 00	140 00		20 10				5 02	396 48	
Prescott:		94 00	700 00		130 82					924 82	
Caledonia		132 00	120 00							252 00	
Longueuil and Hawkesbury		150 00	203 00							353 00	43 00
Plantagenet, South	12 80	104 00	97 00							213 80	
Prince Edward:	325 19	155 00	700 00		313 90					1494 09	
Ameliasburgh		170 00	140 00		268 68					578 68	
Hallowell	24 79	71 00	73 63		9 20					178 62	
Hillier	10 50	65 00	67 20		4 00				8 00	154 70	
Marysburgh, South	1 40	77 00	76 50		31 88					186 78	
Sophiasburgh	3 92	58 00	62 25		20 80					144 97	

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Peterborough, East:	46 15	420 00	*232 00	99 95	104 50	41 00	13 75	.....	.....	.....	145 28	1054 63	20 14
Asphodel and Belmont	.....	.....	482 70	45 45	30 00	.....	.....	.....	.....	31 19	77 43	259 27	10 94
Douro and Dummer	.....	.....	.....	.....	.....	.....	.....	200 00	.....	.....	56 42	256 42	39 30
Burleigh	.....	.....	55 25	54 99	16 87	.....	.....	.....	.....	.....	18 35	145 47	31 00
Otonabee	.....	.....	.....	.....	.....	.....	38 15	50 00	100 00	59 00	35 55	282 75	46 50
Peterborough, West:	.....	420 00	350 75	27 65	98 00	41 00	41 00	.....	19 28	29 77	97 85	1128 40	18 32
Monaghan, South	26 05	.....	74 75	28 75	37 50	.....	.....	.....	.....	.....	32 50	199 55	9 92
Smith and Ennismore	.....	.....	143 00	65 00	47 50	55 75	.....	.....	.....	19 42	61 25	391 92	102 33
Peterborough Horticultural	.....	.....	.....	137 50	.....	.....	.....	.....	.....	10 00	42 16	189 66	206 82
Prescott:	31 42	420 00	206 25	84 75	104 00	.....	.....	.....	.....	16 21	58 50	921 13	3 69
Caledonia	.....	.....	.....	‡240 00	.....	.....	.....	.....	.....	.....	12 00	252 00	.....
Longueuil and Hawkesbury	.....	.....	.....	338 00	.....	.....	.....	.....	.....	.....	58 00	396 00	.....
Plantagenet, South	.....	.....	72 42	61 42	30 90	.....	.....	.....	.....	3 54	30 00	198 28	15 52
Prince Edward:	.....	420 00	350 00	82 80	105 30	.....	19 25	.....	.....	310 87	106 49	1393 71	100 38
Ameliasburgh	41 64	.....	209 80	56 95	39 50	.....	.....	103 00	.....	68 57	43 60	563 06	15 62
Hallowell	.....	.....	77 50	30 90	26 25	.....	.....	.....	.....	4 90	26 55	166 10	12 52
Hillier	.....	.....	55 50	26 45	22 40	.....	.....	.....	.....	10 30	13 55	128 20	26 50
Marysburgh, South	.....	.....	67 05	31 30	54 45	.....	.....	.....	.....	.....	32 67	185 47	1 31
Sophiasburgh	.....	.....	84 35	23 55	21 70	.....	.....	.....	.....	5 75	6 95	142 30	2 47

*$18 unpaid. †$15.15 unpaid. ‡Prizes not classified.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c	$ c.	$ c.
Renfrew, North	112 66	132 50	700 00		197 00					1142 16	
Grattan and Wilberforce		70 00	104 00							174 00	
Pembroke and Stafford		336 20	140 00		205 00					681 20	50 27
Ross		60 00	140 00							200 00	
Renfrew, South	18 19	128 50	700 00		357 98					1204 67	
Admaston	11 43	100 56	101 00							212 99	
Brudenell and Lyndoch	56 41	60 50	77 00				294 79			488 70	
McNab	6 97	74 00	75 00						4 30	160 27	0 77
Arnprior		223 00	133 00	100 00	91 08					547 08	146 42
Russell		90 00	700 00		51 12				134 10	975 22	
Clarence	5 94	104 00	73 00							182 94	
Gloucester	15	60 00	37 00		10 00				56 40	163 53	0 49
Osgoode		210 00	151 00							361 00	
Russell		195 00	146 00		10 10					351 10	
Simcoe, East	49	497 00	700 00	150 00	318 00	136 45			36 25	1838 19	
Medonte	42 39	76 25	140 00							258 64	
Oro		248 39	140 00		16 98				21 75	427 12	66 13
Tiny and Tay	30	183 00	140 00	55 00	31 35					409 65	
Simcoe, West	18 21	132 00	700 00	25 00	207 79				274 55	1357 55	
Nottawasaga		372 75	140 00	190 00	251 58		17 80		23 00	995 13	71 20
Vespra	104 90	91 25	140 00		5 00					341 65	

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Renfrew, North:	.....	350 00	266 50	54 25	79 00	.....	.....	.....	.....	35 00	192 41	977 16	165 00
Grattan and Wilberforce	8 50	.....	*56 50	21 00	25 10	.....	.....	.....	.....	50	32 75	134 95	39 05
Pembroke and Stafford	56 00	.....	97 75	33 25	72 75	.....	.....	.....	.....	341 39	130 33	731 47	.....
Ross	.....	.....	+66 00	42 20	38 00	6 00	.....	.....	.....	.....	49 80	193 80	6 20
Renfrew, South:	.....	420 00	‡180 25	80 00	88 50	.....	.....	.....	.....	447 87	122 63	1200 50	4 17
Admaston	.....	.....	48 00	25 35	19 74	.....	.....	62 61	.....	.....	25 00	180 70	32 29
Brudenell and Lyndoch	.....	.....	42 50	17 75	31 75	.....	.....	235 29	.....	.....	19 55	347 14	141 56
McNab	.....	.....	§59 85	68 05	30 00	.....	.....	.....	.....	2 53	60 50	161 04	.....
Arnprior	.....	.....	137 00	63 75	58 25	.....	1 50	.....	.....	.....	130 62	693 50	.....
Russell:	95	407 00	224 05	98 20	58 45	.....	.....	.....	.....	25 90	129 35	943 90	31 32
Clarence	.....	.....	67 00	70 00	2 25	.....	.....	.....	.....	.....	36 65	175 90	7 04
Gloucester	.....	.....	80 00	40 75	.....	.....	.....	.....	.....	.....	43 29	164 04	.....
Osgoode	2 51	.....	.....	.....	.....	.....	.....	281 80	.....	.....	5 24	289 55	71 45
Russell	.....	.....	161 00	116 00	20 00	.....	.....	.....	.....	.....	54 10	351 10	.....
Simcoe, East:	.....	420 00	534 10	178 00	89 00	.....	.....	.....	.....	458 02	159 07	1838 19	.....
Medonte	.....	.....	96 75	27 00	23 50	.....	27 00	.....	.....	12 22	21 75	208 22	50 42
Oro	.....	.....	199 25	109 00	70 00	.....	.....	.....	.....	15 00	56 57	493 25	.....
Tiny and Tay	.....	.....	138 00	91 25	60 00	18 50	.....	.....	.....	30 85	47 50	386 10	23 55
Simcoe, West:	.....	280 00	386 00	207 00	90 75	.....	.....	.....	.....	24 40	146 50	1134 65	222 90
Nottawasaga	55 82	.....	337 00	187 25	138 00	.....	7 00	.....	.....	37 50	303 76	1066 33	.....
Vespra	.....	.....	125 00	38 00	54 00	.....	.....	.....	.....	2 00	35 00	254 00	87 65

*$9.40 unpaid. †$8.20 retained. ‡$38.75 retained. §$59.87 retained.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Simcoe, South:	226 95	800 00	700 00		348 15					2075 10	
Essa	1 30	140 00								141 30	
Gwillimbury, West		251 00	136 15		226 25				56 30	669 70	51 91
Innisfil		56 00	32 40		13 00				10 00	111 40	27 92
Tossorontio		152 25	108 00	15 00	187 20					462 45	55 66
Stormont:	56 23	144 00	700 00		285 55					1185 78	
Finch		67 00	140 00						8 10	215 10	
Osnabruck	1 89	94 50	106 24		41 00				39 25	282 88	6 74
Roxborough	59 94	84 00	125 50							269 44	
Toronto, E.D.:	712 57	191 00	550 00		321 35					1774 92	
Victoria, North:	33 04	82 00	700 00	200 00	41 30			75 28	34 04	1165 66	1 38
Bexley and Carden		54 00	53 00							107 00	
Eldon	33 85	108 00	92 00		55 01					288 86	27 90
Fenelon	63 01	64 00	66 00		16 45				7 50	216 96	
Laxton and Digby	7 90	101 00	103 00		1 74					213 64	
Somerville	168 56	102 00	104 00		25 50					340 06	
Victoria, South:	197 29	226 00	700 00	200 00	333 86				90 00	1747 15	
Emily	28 12	76 00	129 64		17 49					251 25	
Mariposa*	27 47	197 50	140 00		131 37					496 34	
Ops	5 60	38 00	65 68							109 28	
Verulam	58 93	53 00	84 68		18 90		83 40			298 91	

* United with E.D. for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Simcoe, South:		420 00	550 00	320 18	354 00		18 00			199 00	195 00	2056 18	18 92
Essa									140 00		1 00	141 00	30
Gwillimbury, West	103 81		260 50	83 00	155 75		9 00			57 44	52 11	721 61	
Innisfil	1 32		58 50	39 50	26 50						13 50	139 32	
Tossorontio	71 71		118 50	108 75	110 25					28 00	80 90	518 11	
Stormont:		371 90	262 00	104 00	141 00		13 00			31 55	137 21	1060 66	125 12
Finch	12 55		62 25	34 50	48 25					26 00	24 55	208 10	7 00
Osnabruck			113 50	35 00	52 50	30 00	26 42				32 20	289 62	
Roxborough			75 50	68 50	49 25						33 00	226 25	43 19
Toronto, E. D.:				343 75					*160 68	22 35	422 42	949 20	825 72
Victoria, North:		420 00	206 75	110 25	34 75		18 25			198 88	32 25	1167 04	
Bexley and Carden	4 47						4 25		75 28		23 00	107 00	
Eldon			84 80	33 65	44 10		7 50			76 55	70 16	316 76	
Fenelon			61 50	33 15	21 70		24 75			11 30	23 00	175 40	41 56
Laxton and Digby			62 25	24 70	22 05		1 00			12 00	34 50	156 50	57 14
Somerville			64 30	47 70	30 70		19 35			44 08	27 02	242 75	97 31
Victoria South: †		420 00	‡50 00				50		77 10	548 72	166 38	1262 70	484 45
Emily			88 75	44 00	25 00					7 13	36 00	210 88	40 37
Mariposa			202 50	59 70	60 40	§30 00				5 78	95 54	473 92	22 42
Ops									58 50		8 10	66 60	42 68
Verulam			67 50	37 50	24 75			83 40			21 54	234 69	64 22

* Paid to Horticultural Society, being half gate receipts. † United with Central Exhibition. ‡ Spring Show. § Reaping Match.

ANALYSIS of Reports of County and Township Agricultural Societies and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Waterloo, North:	91 50	210 00	700 00	250 00	234 35				8 60	1494 45	
Wellesley	147 95	429 65	140 00	40 00	15 18				16 00	788 78	
Woolwich		278 50	138 87	20 00						437 37	49 45
Berlin Horticultural	1 31	65 00	61 69	25 00	11 30					164 30	19 05
Waterloo, South:	449 60	260 00	700 00	255 00	372 02					2036 62	
Wilmot	177 12	454 50	140 00	50 00	292 04				7 50	1121 16	
Preston Horticultural	287 66	72 00	140 00		74 10					573 76	
Welland:	195 92	187 00	700 00	77 90	385 20				96 50	1642 52	
Bertie		93 50	46 00							139 50	
Crowland	10 70	110 00	71 60	10 00						202 30	
Humberstone		106 00	68 85							174 85	
Stamford	53 93	105 50	55 08	50 00					4 20	268 71	
Thorold	23 95	175 00	119 10	30 00					10 75	364 55	
Willoughby	2 93	60 00	41 33	10 00					2 00	116 26	
Wellington, Centre:	53 94	254 00	700 00		123 62			237 48	1 75	1370 79	
Erin	170 57	349 00	113 52		456 60					1089 70	
Garafraxa, West	63 88	176 25	55 38						3 50	331 01	
Luther		70 00	30 46		5 00					105 46	5 30
Nichol*	30 65	171 00	77 28							278 93	
Pilkington		183 50	70 61		90 40				234 75	579 26	
Elora Horticultural	23 13	79 00	36 00		13 62					151 75	
Fergus Horticultural	56 17	80 00	36 46		56 44					229 07	

* United with E. D. Society for Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden, and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Waterloo, North:		340 52	479 75	210 75	115 56						328 93	1475 45	19 00
Wellesley			332 75	144 00	26 00		1 75			31 04	103 85	639 39	149 39
Woolwich			248 00	87 00	46 50						54 61	486 82	
Berlin Horticultural				136 50						3 00	43 85	183 35	
Waterloo, South:		280 00	657 50	153 90	81 00						514 17	1686 57	350 05
Wilmot			354 25	184 00	88 25					43 10	147 57	817 70	303 99
Preston Horticultural				166 50						26 85	89 95	283 30	290 46
Welland:		420 00	574 00	86 00	140 91					100 00	159 81	1480 72	161 80
Bertie	8 97		53 35	9 25	12 70					16 00	26 17	126 44	13 06
Crowland			101 35	17 50	19 05						35 81	174 71	28 09
Humberstone			88 71	27 67	30 35						27 75	174 28	00 57
Stamford			148 50	35 30	19 25					33 00	23 65	259 70	9 01
Thorold			*207 00	42 47	34 13		8 63				44 68	322 21	32 34
Willoughby			72 50	17 13	9 70						15 40	114 73	1 53
Wellington, Centre:		419 92	340 75	166 00	110 50		31 50			10 72	151 25	1229 64	141 15
Erin			277 50	185 25	138 90	10 00				234 50	155 98	1002 13	87 57
Garafraxa, West			63 50	43 25	35 50		47 50			1 70	64 12	255 57	75 44
Luther			41 79	22 51	11 37						35 09	110 76	
Nichol									237 28		30 00	267 28	11 65
Pilkington			253 50	121 75	89 50						48 47	513 32	66 04
Elora Horticultural				108 00							33 00	141 00	10 75
Fergus Horticultural				134 25							41 82	176 07	53 00

* $14.76 unpaid.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Wellington, South:	52 14	503 00	700 00	.....	1008 50	.....	.....	.....	29 14	2292 78	.....
Eramosa	4 28	301 35	140 00	.....	130 00	.....	.....	.....	.....	575 63	.....
Puslinch	107 14	306 00	140 00	.....	.....	.....	.....	.....	10 76	563 90	.....
Wellington, West:	55 53	183 50	700 00	.....	73 00	.....	.....	35 25	.....	1047 28	.....
Arthur	48 40	161 00	73 79	20 00	13 95	.....	.....	.....	33 25	350 39	.....
Minto*	20 75	75 00	72 00	.....	.....	.....	.....	.....	153 77	321 52	3 46
Peel and Maryburgh	.....	80 00	123 61	.....	72 50	.....	.....	.....	5 00	280 11	.....
Mount Forest Horticultural	40 00	229 00	91 18	.....	301 82	1732 70	.....	.....	36 00	2430 70	71 21
Palmerson Horticultural	99 00	135 00	56 40	.....	96 34	.....	30 00	.....	.....	416 74	.....
Clifford Horticultural	.....	141 70	39 95	.....	.....	.....	.....	.....	11 88	225 71	.....
Wentworth, North:†	583 34	133 00	700 00	300 00	.....	.....	.....	223 38	.....	1939 72	.....
Beverly	123 40	612 00	120 00	40 00	100 75	.....	.....	.....	.....	996 15	
Flamboro', East	.....	230 00	100 00	60 00	30 00	.....	.....	.....	.....	420 00	.....
Flamboro', West	69 98	270 00	140 00	20 00	31 75	.....	.....	.....	.....	531 73	.....
Wentworth, South:‡	429 17	320 00	700 00	300 00	.....	.....	.....	233 76	9 00	1991 93	.....
Ancaster	.....	252 25	140 00	50 00	30 07	.....	.....	.....	.....	472 32	.....
Barton and Glanford	73 16	162 50	137 00	60 00	.....	.....	.....	.....	1 00	433 66	.....
Saltfleet and Binbrook	.....	160 50	140 00	75 00	16 10	.....	.....	.....	108 25	499 85	.....

* United with E. D. Society for Exhibition. † United with S. E. D. Society and Hamilton E. D. Society for holding Great Central Fair.
‡ United with N. E. D. Society and Hamilton E. D. Society for holding Great Central Exhibition.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for Previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
WELLINGTON, SOUTH:	.....	280 00	*611 50	216 50	75 00	.....	15 50	.....	.....	† 607 40	342 87	2134 27	158 51
Eramosa	.....	.....	238 75	86 75	58 50	.....	.....	.....	.....	39 73	77 60	501 33	74 30
Puslinch	.....	.....	205 50	78 50	26 00	.....	.....	.....	.....	.....	104 24	414 24	149 66
WELLINGTON, WEST:	.....	420 00	†187 75	87 25	58 25	.....	42 50	.....	.....	8 00	237 49	1016 24	31 04
Arthur	.....	.....	101 75	59 25	36 25	.....	2 00	.....	.....	7 95	66 78	273 98	76 41
Minto	.....	.....	.....	.....	.....	.....	11 80	.....	.....	294 28	19 10	325 08	.....
Peel and Maryburgh	.....	.....	124 00	51 50	22 00	.....	.....	.....	.....	36 25	28 00	261 75	18 36
Mount Forest Horticultural	.....	.....	147 00	139 50	51 00	.....	.....	60 27	.....	1148 99	‡955 15	2501 91	.....
Palmerson Horticultural	.....	.....	70 00	72 00	34 00	.....	33 20	.....	.....	.....	123 83	333 03	83 71
Clifford Horticultural	.....	.....	70 00	46 25	43 75	.....	.....	.....	.....	21 44	26 39	207 83	17 88
WENTWORTH, NORTH:	.....	360 00	.....	.....	.....	.....	.....	.....	1300 00	.....	14 30	1674 30	265 42
Beverly	.....	.....	320 00	191 55	120 45	.....	7 00	.....	.....	36 84	142 77	818 61	177 54
Flamboro' East:	.....	.....	166 50	84 50	42 50	.....	.....	.....	.....	.....	59 90	353 40	66 60
Flamboro' West	.....	.....	171 75	102 25	29 25	.....	.....	.....	.....	56 28	76 82	436 65	95 38
WENTWORTH SOUTH:	.....	417 00	.....	.....	.....	50 00	.....	.....	1279 00	.....	61 17	1807 17	184 76
Ancaster	19 50	.....	201 75	115 00	38 50	.....	.....	.....	.....	2 50	85 54	463 09	9 23
Barton and Glanford	.....	.....	171 00	83 50	27 00	.....	.....	.....	.....	.....	73 17	354 67	78 99
Saltfleet and Binbrook	41 27	.....	§305 50	.....	.....	.....	.....	.....	.....	.....	90 31	437 08	62 77

* $14.50 unpaid. † $25 unpaid. ‡ $844 for Note and Discharge of Mortgage. § Unclassified.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

RECEIPTS FOR THE YEAR 1881.

SOCIETIES.	Balances in hand.	Subscriptions and Donations.	Legislative Grants.	Municipal Grants.	Rents of and Admissions to Grounds.	Moneys on Loan.	Sale of Machinery, Stock, Seeds, etc.	From other Societies for Amalgamation.	Miscellaneous Minor Receipts.	Totals of Receipts.	Balances due Treasurer.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
York, North:	272 77	648 50	700 00	150 00	558 11					2329 38	
Gwillimbury, East	40 50	227 00	140 00	30 70						438 20	
Gwillimbury, N., and Georgina	35 42	191 50	116 48	24 57	177 35					545 32	
King	14 34	138 00	88 32	18 63	359 26				151 50	770 05	
Whitchurch	267 19	175 75	78 88	15 80	158 48					698 10	
York, West:	636 85	186 00	700 00	125 00					15 00	1662 85	
Etobicoke	36 32	81 00	165 00	100 00	127 15				78 00	587 47	
Vaughan	330 18	251 25	140 00	25 00	441 02				*600 00	1787 45	
York, East:	126 78	1703 00	621 00	125 00				219 20		3972 98	
Markham†	91 05	70 00	124 20	25 00					22 00	332 25	
Scarborough	348 38	162 00	124 20	25 00	132 00				200 55	992 33	

* Balance from E. D. Society for Union Fall Show. † United with E. D. Society for Fall Show.

ANALYSIS of Reports of County and Township Agricultural Societies, and of Horticultural Societies—*Continued.*

EXPENDITURES FOR THE YEAR 1881.

SOCIETIES.	Balances due Treasurers.	Legislative Grants to Township Societies.	Prizes for Animals.	Prizes for Field, Garden and Dairy Products.	Prizes for Manufactures, Fine Arts and Ladies' Work.	Prizes for Ploughing.	Prizes for previous years paid.	Purchase of Machinery, Stock, Seeds, etc.	Grants to Union Exhibitions.	Buildings and Grounds, Interest & Insurance.	Working and Miscellaneous Expenses.	Totals of Expenditure.	Balances in hand.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
York, North :	.....	*509 38	599 50	263 25	280 00	.....	20 25	.....	.....	176 30	249 86	2098 54	230 84
Gwillimbury, East	.....	.....	137 00	56 25	58 00	.....	.....	.....	.....	.....	112 88	364 13	74 07
Gwillimbury, N., and Georgina	.....	.....	134 50	44 00	42 70	.....	21 60	.....	.....	143 45	58 00	443 70	101 62
King	.....	.....	275 25	80 00	150 00	.....	.....	.....	.....	19 66	132 62	657 53	112 52
Whitchurch	.....	.....	192 00	95 00	102 00	.....	.....	.....	.....	.....	86 00	475 00	223 10
York, West†	.....	280 00	‡106 00	.....	9 00	.....	72 00	.....	600 00	.....	§192 48	1259 48	403 37
Etobicoke	.....	.....	187 00	88 00	104 00	.....	4 00	.....	.....	36 35	112 61	531 96	55 51
Vaughan	.....	.....	418 50	197 00	266 00	.....	.....	.....	.....	296 43	356 63	1534 56	252 89
York, East :	.....	.....	1237 00	526 50	391 50	.....	2 00	.....	.....	283 35	436 17	3449 20	523 78
Markham	.....	.....	.....	.....	.....	.....	.....	.....	258 20	.....	25 00	283 20	49 05
Scarboro'	.....	.....	272 50	141 50	99 50	.....	.....	.....	.....	30 76	124 48	668 74	323 59

* $85.70 paid from County Grant. † United with Vaughan Society for Fall Exhibition. ‡ Prizes at Spring Show.
§ $50 Municipal grants to Etobicoke and Vaughan.

AMOUNTS PAID TO AGRICULTURAL SOCIETIES IN ONTARIO IN 1882.

Electoral District Societies.	Grants.	Electoral District Societies.	Grants.
	$ c.	*Brought forward*	$ c. 29,750 00
Addington	700 00	Middlesex, North	700 00
Algoma	700 00	Middlesex, East	700 00
Brant, North	700 00	Middlesex, West	700 00
Brant, South	700 00	Monck	700 00
Bruce, North	700 00	Muskoka	700 00
Bruce, South	700 00	Niagara	350 00
Brockville	700 00	Norfolk, North	700 00
Cardwell	700 00	Norfolk, South	700 00
Carleton	700 00	Northumberland, East	700 00
Cornwall	350 00	Northumberland, West	700 00
Dufferin	700 00	Ontario, North	700 00
Dundas	700 00	Ontario, South	700 00
Durham, East	700 00	Ottawa	350 00
Durham, West	700 00	Oxford, North	700 00
Elgin, East	700 00	Oxford, South	700 00
Elgin, West	700 00	Peel	700 00
Essex, North	700 00	Perth, North	700 00
Essex, South	700 00	Perth, South	700 00
Frontenac	700 00	Peterborough, East	700 00
Grenville, South	700 00	Peterborough, West	700 00
Glengarry	700 00	Prince Edward	700 00
Grey, North	700 00	Prescott	700 00
Grey, South	700 00	Renfrew, North	700 00
Grey, East	700 00	Renfrew, South	700 00
Halton	700 00	Russell	700 00
Haldimand	700 00	Simcoe, East	700 00
Hamilton	350 00	Simcoe, West	700 00
Hastings, North	700 00	Simcoe, South	700 00
Hastings, East	700 00	Stormont	700 00
Hastings, West	700 00	Toronto	550 00
Huron, East	700 00	Victoria, North	700 00
Huron, West	700 00	Victoria, South	700 00
Huron, South	700 00	Waterloo, North	700 00
Kent, East	700 00	Waterloo, South	700 00
Kent, West	700 00	Welland	700 00
Lambton, East	700 00	Wellington, Centre	700 00
Lambton, West	700 00	Wellington, South	700 00
Lanark, North	700 00	Wellington, West	700 00
Lanark, South	700 00	Wentworth, North	700 00
Lennox	700 00	Wentworth, South	700 00
Leeds, South	700 00	York, North	700 00
Leeds, N., and Grenville, N.	700 00	York, West	700 00
Lincoln	700 00	York, East	700 00
London	350 00		
Carried forward	29,750 00	Total	59,000 00

PAYMENTS FOR THE ENCOURAGEMENT OF AGRICULTURE IN 1882.

Service.		Appropriation.	Expended in 1882.	Unexpended or Over-expended.
		$ c.	$ c.	$ c.
Electoral District Agricultural Association Societies		59,350 00	59,000 00	*350 00
Outlying Districts—Haliburton, $150; Minden, $150		300 00	300 00	
Agricultural and Arts Association		10,000 00	10,000 00	
Western Dairymen's Association		1,500 00	1,500 00	
Eastern Dairymen's Association		1,500 00	1,500 00	
Ontario Fruit Growers' Association		1,800 00	1,800 00	
Ontario Entomological Society		1,000 00	1,000 00	
Ontario Poultry Society		700 00	700 00	
Sundries.				
John Notman, stationery	994 66			
C. B. Robinson, printing	1126 92			
Warwick & Son, binding	1403 95			
D. W. Beadle, W. Saunders and W. Brown, attending two Forestry Congresses, Cincinnati and Montreal	345 60			
Prof. Smith, veterinary services	15 00			
Willing & Williamson, veterinary prize books	20 00			
Six Nations' Agricultural Society	50 00			
Express charges	10 00			
		2,000 00	3,966 13	†1,966 13
Totals		78,150 00	79,766 13	†1,616 13

* Unexpended. † Over-expended.

APPENDIX TO REPORT

OF THE

Commissioner of Agriculture and Arts.

APPENDIX (B).

REPORT OF THE COUNCIL OF THE AGRICULTURAL AND ARTS ASSOCIATION OF ONTARIO FOR 1882.

To the Hon. S. C. Wood,

Commissioner of Agriculture, etc.

I have the honour, on behalf of the Council of the Agricultural and Arts Association of Ontario, to present a condensed Report of their proceedings for 1882, up to the 1st of November, the Auditors' Statement for 1881, the Prize Farm Report for 1882, the Prize Essays on "The Homestead" and "Manures," the results in tabulated form of the Dominion and 37th Provincial Exhibition for 1882, the Live Stock Report of the 37th Provincial Exhibition, the Prize Awards for the Provincial Exhibition for 1882, and the Report of the Veterinary College for 1881-1882.

I have the honour to be,

Your obedient Servant,

HENRY WADE, *Secretary.*

APPENDIX TO REPORT

OF THE

Commissioner of Agriculture and Arts.

APPENDIX (B).

REPORT OF THE COUNCIL OF THE AGRICULTURAL AND ARTS ASSOCIATION OF ONTARIO FOR 1882.

OFFICE OF THE AGRICULTURAL AND ARTS
ASSOCIATION OF ONTARIO,
TORONTO, NOVEMBER, 1882.

To the HON. S. C. WOOD,
Commissioner of Agriculture, etc., etc.

I have the honour again, on behalf of the Council of the Agricultural and Arts Association of Ontario, to present to you their Annual Report, commencing with the month of November, 1881, at which date our last Report closed.

The Council at that date consisted of the following gentlemen :—

Elected Members of the Council.—District No. 1, D. P. McKinnon, South Finch ; No. 2, Ira Morgan, Metcalfe ; No. 3, Joshua Legge, Gananoque ; No. 4, J. B. Aylesworth, Newburgh ; No. 5, John Carnegie, Peterborough ; No. 6, George Graham, Brampton ; No. 7, George Moore, Waterloo ; No. 8, J. C. Rykert, M.P., St. Catharines ; No. 9, Henry Parker, Woodstock ; No. 10, J. Hunter, Eden Grove ; No. 11, L. E. Shipley, Greystead ; No. 12, Stephen White, Chatham ; No. 13, Charles Drury, Crown Hill.

Ex-officio Members.—Hon. S. C. Wood, Commissioner of Agriculture, etc., Toronto ; D. McCrae, Guelph, President of the Mechanics Institutes' Association of Ontario ; Otto Klotz, Preston, Vice-President of the Mechanics Institutes' Association of Ontario ; E. Jackson, Newmarket, Elected Member of the Mechanics Institutes' Association of Ontario ; P. C. Dempsey, Albury, President of the Fruit Growers' Association ; George Buckland, Toronto, Professor of Agriculture in the University of Toronto ; Hon. A Crooks, Minister of Education, Ontario ; William Saunders, President of the Entomolo-

gical Society, London ; K. Graham, Belleville, President of the Dairymen's Association of Eastern Ontario ; E. Caswell, Ingersoll, President of the Dairymen's Association of Western Ontario ; Hon. G. W. Allan, President Ontario Society of Artists, Toronto ; James Thompson Bell, Professor of Agriculture, Albert College, Belleville ; James Mills, Principal Ontario School of Agriculture, Guelph ; William Brown, Professor of Agriculture, Ontario School of Agriculture, Guelph.

Officers.—President—J. B. Aylesworth, Newburgh ; Vice-President—C. Drury, Crown Hill ; Treasurer—George Graham, Brampton ; Secretary—Henry Wade, Toronto ; Auditors—John I. Hobson, Mosborough, and J. A. Widdifield, M.P.P., Newmarket.

A meeting of the members of the Council, as above, took place, pursuant to a call of the President, at the Board Room, Agricultural Hall, Toronto.

Members present—Messrs. Aylesworth (President), Dempsey, Prof. Bell, Shipley, Legge, Hunter, McKinnon, Klotz, Carnegie, Moore, Morgan, McCrae, Graham, Prof. Buckland, Saunders, White, Caswell and Drury.

The Secretary read the minutes of the several meetings held in London during the Exhibition, which were, on resolution, confirmed.

A letter was read from Mr. Hugh Love, sen., of Hill's Green, asking the Council to start a Stud Book for Clydesdale Horses, which, at a later stage of the meeting, on resolution, was agreed to.

A letter was read from R. L. Denison, Assistant Secretary, resigning his situation, as he had accepted one from the British American Short Horn Association. This, on resolution, was accepted.

A communication was also read from Mr. Roddy, City Clerk of the city of Toronto, in answer to one from the Secretary of this Association, asking the city authorities what preparations they were willing to make for the next Provincial Exhibition, as the delegates at London had voted it to Toronto. The communication read :

"Your Committee have had under consideration a communication from Mr. Henry Wade, Secretary of the Agricultural and Arts Association of Ontario, informing the Council that, at the annual meeting of the Association, it had been decided to hold the Provincial Exhibiton for 1882 at the city of Toronto, and asking if the city was prepared to furnish the necessary accommodation therefor. A conference was held by your Committee with a committee from the Industrial Exhibition Association on the subject, with a view of ascertaining whether the holding of the Provincial Exhibition here in 1882 would prejudicially affect the interests of that Association, with which that of the city is so closely identified. The committee stated that the Industrial Association had during the holding of their late Exhibition and previous to the annual meeting of the Agricultural and Arts Association decided to hold their Annual Exhibition as usual in 1882, for two weeks, commencing on the 11th of September. Your Committee, therefore, while appreciating the honour conferred upon the city in its being selected as the place for the holding of the next Provincial Exhibition, regret very much that under the foregoing circumstances they cannot recommend the Council to make any provision whatever for the holding of the said Provincial Exhibition during the month aforesaid."

A letter was then read from the Mayor of Kingston asking for the Provincial for 1882, also from the Mayor of Guelph, asking if a deputation could have an interview with respect to securing the Provincial for 1882, and a letter from the City Clerk of London, saying that in the event of Toronto declining to have the Provincial next year, their Council had passed a resolution guaranteeing the necessary accommodation.

The Guelph deputation, consisting of the following gentlemen, was then presented : Mayor Slemin, Mr. Laidlaw, M.P.P., Ald. Gowdey, and Mr. John I. Hobson. They stated what accommodation could be given, showed a plan of their Fair Grounds, and offered the necessary accommodation.

A report was then read from the Committee, to whom had been referred the duty of reporting on any necessary amendments to the Agricultural and Arts Act.

(1) That in view of the commendable liberality and enterprise just now being displayed by those interested in the growth and prosperity of particular cities and towns, in organizing and holding annual exhibitions, at which premiums are awarded for the same

classes of stock, products, and articles as are usually exhibited at the Provincial Exhibition, it is expedient that the holding of a Provincial Exhibition annually should not be compulsory, and that the means at the disposal of the Council and the energies of its members be directed in some of the many other channels of usefulness bearing on the propress of Agriculture in this Province.

(2) That in the interests of economy the membership of this Council should be reduced by removing therefrom all the *ex-officio* members, except the Commissioner of Agriculture.

(3) That in the event of the foregoing recommendation being approved of by the Council, they should petition the Ontario Government to secure such legislation as will enable this Council to carry out efficiently the objects already indicated.

HENRY PARKER, *Chairman.*

A draft for a new Act was then submitted and discussed at length by the members of the Council, the result of which was the passing at the next session of the Provincial Legislature amendments to the old Act, which, with the original text, will be found in the Ontario Statutes for 1882.

On motion, Senator Skead, of Ottawa, then addressed the Council on behalf of the City of Ottawa, in order to secure the Exhibition for 1882.

EVENING SESSION OF COUNCIL, *Nov. 24, 1881.*

Same members present that were in attendance during the day.

Moved by Mr. Carnegie, seconded by Mr. Hunter, that the communication from the City of Toronto be referred to a committee, consisting of Messrs. Rykert, Drury and the mover.—Carried.

The committee appointed in London, consisting of Profs. Bell and Buckland, then reported on the subject of Essays, recommending that prizes be offered for the following subjects:

1. *Manures:* Their preparation, application and effect on growing crops, and in maintaining and increasing the fertility of the soil to which they are applied. Competition on this subject to be restricted to practical farmers cultivating land within the Province of Ontario.

N.B.—Quotations of analysis to be excluded and scientific and technical terms to be avoided as far as possible.

2. *The Homestead:* Its arrangements and surroundings, with regard to convenience and comfort, combined with economy, healthfulness and picturesque appearance; including choice of site, dwelling-house and offices, water supply, drainage, farm buildings, shelter-belts, gardens and shrubbery. Open to general competition.

These essays not to exceed twenty-five pages of foolscap in length and to be written on one side of the paper only.

NOTE.—Entries for all essays in this class must be sent to the Secretary not later than the 15th of August, 1882.

The report was adopted.

JAMES BELL,
GEO. BUCKLAND, } *Committee.*

It was then moved by Mr. Saunders, seconded by P. C. Dempsey, that this Association tender to the Commissioner of Agriculture the use of such rooms in the Association buildings as may be required for the purposes of the proposed Bureau of Industries.—Carried.

The Finance Report was then presented, adopted and the several accounts ordered to be paid. The Council then adjourned until Friday morning, 10 a.m.

Friday Morning, Nov. 25th, 1881.

Council met in Agricultural Hall pursuant to adjournment. Same members present that were in attendance yesterday.

President Aylesworth in the chair.

The following Herd Book Report was then submitted:

1. That the Committee be authorized to communicate with the Quebec Board of Agriculture with reference to the publication of a Herd Book for Ayrshire cattle.

2. Your Committee would recommend that an appendix be published to the fifth volume of the Canada Short Horn Herd Book, showing all those cattle registered in the third and fourth volumes not up to the standard necessary to the registration of their progeny.

3. That in the 5th and 6th volumes, now ready for publication, no pedigree shall be published not up to the standard adopted by the Council unless in the case of females already registered and having seven crosses, and their progeny.

4. They would suggest that a Revising Committee, composed of two members of the Council, and the Secretary, be appointed by the Council, whose duty it shall be to carefully examine into all doubtful pedigrees, and whose decision shall be final, and also to take steps for the early publication of vol. 5 and 6, and that in future these shall be annual publications of the said book.

5. That in future no certificates, unless specially required, shall be issued, but the Secretary shall send a post-card giving the name of the animal, the breeder's name, and a sufficient reference to the Herd Book in accordance with the form herewith submitted:

Canada Short Horn Herd Book.

This is to certify that ....

has registered a ....

Named ....

Calved..... *Colour*..... ...*Reg. No*.....

Bred by .....*P.O*.....

Owned by ....*P.O*..... ....

And that the complete Pedigree shall appear in the.....*Volume of the Herd Book.*

(Signed by Secretary.)

6. That on receiving a doubtful pedigree the Secretary shall forthwith notify the parties sending the same, that the pedigree is held for the decision of the Revising Committee.

7. We suggest that the Revising Committee have power to procure evidence to their satisfaction, with reference to all doubtful pedigrees, and generally to take such other steps as may be necessary to secure the efficient carrying out of the work.

JOHN CARNEGIE, *Chairman.*

This report, after discussion, was adopted.

J. C. Rykert, M.P., then presented the following report:

Your Committee having had under consideration the question of holding an exhibition in 1882, in consequence of the action of the City of Toronto, has had no little difficulty in advising the Council as to the course it should pursue. The Committee does not recognise the right of the City of Toronto to say that the Exhibition shall not be held on the grounds now leased to the Industrial Exhibition, inasmuch as these grounds were leased to the City of Toronto, at the joint request of this Council and the city, and the intention of the Government was especially set forth in the lease itself. The words of the lease admit of no doubt on this point, and there is but little doubt that this Council

could, if it felt disposed, invoke the proceedings of the Court to compel the Industrial Exhibition to stand aside, and give up the grounds to this Association whenever it was decided to hold the Exhibition in the City of Toronto. In the lease, bearing date April 25th, 1878, we find the following words: "All that westerly portion of the Military Reserve in the City of Toronto, known as the Garrison Common, is conveyed for exhibition purposes in connection with the Agricultural and Arts Association, of the Province of Ontario."

If the rights of this Association were not intended to be recognised, it was quite needless to use the words: *In connection with the Agricultural and Arts Association of the Province of Ontario.*

Your Committee would remind the Council that an application was made to this Council, by the City of Toronto, to yield up its claim to the old grounds and buildings, expressly on condition that the same right and lien should be transferred to the new grounds. After several interviews between this Council and the City Council our consent was given to the surrender of the old grounds, expressly and only on condition that this Council should have the privilege of holding the Exhibition in the new grounds, whenever the delegates at the annual meeting should determine to hold the Exhibition in this city.

After much negotiation with the Government, and with the active interference and co-operation of the late Hon. David Christie, the leave was granted with the condition therein expressed.

This Council recognising its right to the new grounds, at the request of the City of Toronto made a grant of $4,000 towards the buildings on the new grounds, but at no time did it intimate its willingness or consent to hold the Exhibition two years consecutively in this city. Your Committee would remind the Council that neither the Council nor any of its members could make any promise in regard to the future holding of the Exhibition, in view of the express terms of the Act of Parliament, which declares that the delegates at the Annual Meeting shall say where the Exhibition shall be held. Your Committee deeply regret that the City of Toronto should forget the pledges they made to the Agricultural and Arts Association, when the leave was obtained, and ignore the right of this Association to hold the Exhibition in this city whenever determined by the delegates.

While desirous of maintaining the rights of this Association, your Committee feel that no good can be obtained by entering into litigation with a body of men who will pander to local interests to the detriment of the general public. They believe that the agriculturists of this Province will endorse the action of this Council in its determination to take the Exhibition to some other city where ample accomodation can be offered, and where a large amount of good may be done by holding such Exhibition.

Your Committee would recommend that the Council keep faith with the delegates as expressed at the Annual Meeting, and hold an exhibition in 1882.

All of which is respectfully submitted.

J. C. Rykert, *Chairman.*

This report was adopted.

A vote was then taken as to whether the Exhibition was to be held in the City of Kingston, for 1882, but, on motion, it was postponed until the first meeting of the Council, in 1882; a vote of thanks was then tendered to the retiring President, J. B. Aylesworth, Esq., and the Council adjourned.

Thursday, March 23rd, 1882.

The Council met, this day, at 2 o'clock p.m., at the Association's Board Room, Agricultural Hall, pursuant to the call of the Secretary.

The Secretary called the meeting to order, and read a notice from Geo. Buckland, Secretary of Bureau of Agriculture, stating that the following gentleman had been re-elected members of the Council:—Division No. 1, D. P. McKinnon, South Finch; No. 2,

Ira Morgan, Metcalfe; No. 3, Joshua Legge, Gananoque; No. 4, J. B. Aylesworth, Newburgh.

Members present—C. Drury, S. White, J. Carnegie, J. Hunter, J. Legge, D. P. McKinnon, J. B. Aylesworth, J. Morgan, Geo. Graham, J. C. Rykert, M.P., L. E. Shipley and W. Parker.

The Secretary stated that, in the interval between the last meeting and this one, special legislation had done away with all the *ex-officio* and Mechanics' Institute members, with the exception of the Commissioner of Agriculture, and that the Council now consisted of the thirteen elected members, and from amongst those gentlemen the election of a President was now in order.

It was then moved by J. B. Aylesworth, seconded by J. C. Rykert, M.P., that Mr. Charles Drury, of Crown Hill, be President for the ensuing year.—Carried.

Mr. Drury, on taking the chair, thanked the Council for the honour done him, and expressed a wish that the new era, just inaugurated under the amended Act, would be a prosperous one, and although in losing the *ex-officio* members of the Council several of their ablest men had gone, they must still show the country that, as farmers and representatives of farmers, they could still carry out the affairs of the Association successfully.

Moved by Mr. Legge, seconded by Mr. White, that D. P. McKinnon be elected Vice-President.—Carried.

Mr. McKinnon thanked the Association. It was then,—

Moved by Mr. Aylesworth, seconded by Mr. White, that George Graham be re-appointed Treasurer.—Carried.

Messrs. Rykert, White, and Morgan were appointed a committee to strike the standing committee for the year.

Mr. Graham, the Treasurer, then submitted his accounts for the previous year as examined and passed by the Auditors, showing that with the balance on hand, $1,666.09, at the commencement of 1881, the sum of $34,035.78 had been received, and the sum of $31,093.51 expended, leaving a balance of $4,608.36 on hand as per abstract herewith submitted:

ABSTRACT OF RECEIPTS AND EXPENDITURES of the Agricultural and Arts Association, as classified by the Auditors, for the year ending 31st December, 1881.

RECEIPTS.			EXPENDITURE.		
		$ cts.			$ cts.
To Balance on hand, January 1st, 1881		1,666 09	By Exhibition Expenses (including Printing and Stationery)		6,784 32
" Herd Book and Registration Fees		2,550 46	" Salaries		3,284 17
" Interest		78 00	" Postage		416 20
" Rent		1,393 00	" Prizes		13,562 00
" Legislative Grant		10,000 00	" Board Expenses :		
" Prize Account		482 00	Ordinary	$1,247 29	
" Members' Fees		1,316 00	Exhibition	1,163 68	
" Exhibition Receipts :					2,410 97
Turnstiles	$16,827 37		" Herd Book and Registration Fees (including Printing and Stationery)		1,300 23
Booth Rents	1,072 00		" Veterinary College		530 00
Licenses	253 00		" Printing, miscellaneous		383 89
		18,152 37	" Stationery, miscellaneous		52 50
" Miscellaneous		63 95	" Interest		262 50
			" Special Grant to London		1,000 00
			" Legal		8 01
			" Miscellaneous		819 97
			" Prize Farms		278 75
					31,093 51
			Balance		4,608 36
		35,701 87			35,701 87

Audited and found correct.

JOHN I. HOBSON,
J. H. WIDDIFIELD, } *Auditors.*

TORONTO, 21st January, 1882.

STATEMENT.—Assets and Liabilities of the Agricultural and Arts Association of Ontario. 31st December, 1881.

ASSETS.	$ cts.	LIABILITIES.	$ cts.	$ cts.
To Cash in Bank	4,608 36	By Mortgage on Real Estate	5,000 00	
" Real Estate, corner of Yonge and Queen Streets	30,000 00	" Balance due Veterinary College Museum	514 81	
" Special Deposit in Bank of Commerce, Prince of Wales Prize	800 00			
" Amount due from late Secretary	289 54			
" Library, 1,628 (insured for $2,000) valued at	3,000 00			
" Herd Book: 41 copies of Vol I	82 00			
" " " 92 " " II	240 00			
" " " 38 " " III	95 00			
" " " 414 " " IV., 1st part	895 00			
" " " 183 " " IV., 2nd part				
" Silver Medals, 36 at $10.00	360 00			
" Bronze " 59 at $ 2.00	118 00			5,514 81
" Furniture, Office and Agricultural Hall	300 00	" Balance of Assets over Liabilities		35,272 99
	40,787 80			40,787 80

Audited and found correct.

JOHN I. HOBSON, } *Auditors.*
J. H. WIDDIFIELD, }

TORONTO, 21st January, 1882

The Treasurer's Report, as tabulated, was adopted. The correspondence was then read referring to changes in the Herd Book and alterations in the Prize List, for the year, also asking the Council to appoint a judge for the Fat Cattle Show to take place at Chicago in the month of November. A communication was also read from the Secretary as to what he had done during the interval from last meeting, and suggesting that reports on the live stock and machinery exhibits at the next Provincial should form a part of our Annual Report to the Commissioner, and that the Prize Award be published in that also, instead of issuing a separate pamphlet, and that a copy be sent to each member of the Agricultural and Arts Association. A letter was also read from Mr. A. H. White, of Charing Grove, asking to be appointed to the vacant office of Superintendent.

It was then moved by Mr. Carnegie, seconded by Mr. McKinnon, that the thanks of this Council are due and are hereby tendered to the Hon. S. C. Wood for the hearty manner in which he fell in with and carried through the Legislature the amendments to the Agricultural and Arts Act, recommended at the last meeting of the Council.—Carried.

The Hon. Mr. Wood opportunely appearing at this stage of the meeting, the resolution was read to him by the President.

Hon. Mr. Wood replied thanking the Council for the compliment, and stating that he had carried out, not only the wishes of the Council but of the people of the Province generally. He also addressed the Council on the subject of the Bureau of Industries, and thanked them for the accommodation offered in the way of offices, and also said that the Government thought it advisable to have all their agricultural offices in the one building, and make it the headquarters of agriculture for Ontario.

A deputation from Ottawa, consisting of Senator Skead and Dr. St. Jean, Mayor of Ottawa, then appeared for the purpose of presenting the claims of Ottawa for the next Provincial Exhibition, which they did in an eloquent manner.

Mr. Carnegie then presented the Report of the Herd Book Committee as follows :—

That since the last meeting of the Council they have held one meeting for the consideration of doubtful pedigrees, and that by correspondence and otherwise they have given their best consideration to the important matters entrusted to them. That they had awarded the contract for printing and binding the 5th and 6th volumes of the Herd Book to Messrs. Hunter & Rose, on satisfactory terms. The work on the 5th volume was well advanced, and it is expected that owing to the change made in the type used, and the judicious arrangement and abbreviation of cow pedigrees adopted by your Secretary, both sexes can be put in the 5th and 6th volumes (instead of being in two parts, like the 4th volume), and still be of reasonable dimensions, and should no unforeseen event occur your Committee anticipate no difficulty in issuing the current or 7th volume early in 1883.

Your Committee would recommend the opening of a Clydesdale Stud Book, with a fee charge of two dollars, subject to such rules as the Committee may adopt; also the opening of a register for Suffolk and Poland China Pigs, subject to same rules now in force with regard to Berkshires.

Since your last meeting the Secretary has made a satisfactory exchange of Herd Books with the English Herd Book Association, and the Association now have a complete set of Coates' Short Horn Herd Book, as well as the American Short Horn Herd Book in their library.

In conclusion, your Committee are well satisfied with the number of registrations since the change of standard, and are also pleased with the number of Herd Books sold for the last year.

All of which is respectfully submitted.

JOHN CARNEGIE, *Chairman.*

A Special Committee, consisting of the President, Mr. Aylesworth and Mr. Carnegie, was appointed to confer with Professor Buckland, on the feasibility of carrying out the examination scheme of Prof. Mills, approved of at the last annual meeting of the Association. It was also resolved that the thanks of the Council be tendered to the Hon. Mr. Wood, Commissioner of Agriculture, for his kindness in presenting a number of copies of the Agricultural Commission Reports to members of this Council.

Meeting adjourned until 7.30 p.m., when it sat again, the same members being present.

The President, Mr. Drury, in the chair.

Mr. Rykert then presented the Report of the Committee for striking the Standing Committees for the year, and would recommend the following:—

Executive and Building.—Rykert, Morgan, White, Graham, and Legge.

Gates and Turnstiles.—Aylesworth, McKinnon, Moore, Hunter, and Shipley.

Finance and Printing.—Parker, Morgan, Carnegie, White, and Rykert.

Herd Books.—Carnegie, Moore, Graham, and the Secretary.

Prize Forms.—Moore, Parker, and Hunter.

The President to be *ex-officio* a member of all the committees.

All of which is respectfully submitted.

J. C. Rykert, *Chairman.*

The report was, on motion, adopted.

Mr. Carnegie then read a report on the feasibility of holding the examinations according to the scheme of Prof. Mills; it was afterwards discussed, and the Council finally agreed to postpone the matter to a future period.

On motion of Mr. Carnegie, seconded by Mr. Aylesworth, it was decided that the Exhibition for 1882 be held during the third week of September, commencing on Monday, the 18th, and for one week only.

It was resolved that the Secretary communicate with the Mechanics' Institute Association, the Dairymen's Associations (East and West), and the Fruit Growers' Association, and ascertain if the said associations, or any of them, will join with the Agricultural and Arts Association in holding the Annual Exhibition, and also the terms on which they are willing to unite for that purpose.

Council adjourned until Friday morning, at 9 o'clock.

———

Friday, 9 a.m., March 27th, 1882.

Council met, pursuant to adjournment, all the members present that were in attendance yesterday. The President in the chair.

A letter was read from Mr. P. Jamieson, asking the Council for a lease of the whole of the lower flat and half of the upper one, for a term of twenty years. This was referred to a committee of the whole Council, and they decided to lease this part of the building for a term of ten years.

Mayor Gasken, of Kingston, was then heard on behalf of his city, asking for the Exhibition for 1882. The Ottawa deputation had spoken the day before.

It was moved by Mr. Carnegie, seconded by Mr. Rykert, That the Exhibition be held in the City of Kingston, provided satisfactory arrangements therefor can be made.

Moved in amendment by Mr. Ira Morgan, seconded by Mr. S. White, That the next Exhibition be held in the City of Ottawa, provided that all accommodation that is required by this Association be made.

After several eloquent speeches from members of the Council *pro* and *con.*, a vote was taken on the amendment, which was declared lost.—Yeas, 5; nays, 6.

The original motion declaring Kingston to be the place was then carried by the same division.

The Mayor of Kingston then thanked the Council, and said he would see that every accommodation was provided.

Senator Skead and Mayor St. Jean, of Ottawa, also thanked the Council for their courteous reception.

On resolution, Mr. A. H. White was appointed General Superintendent in the room of Mr. H. Anderson resigned. A. Smith, V.S., was heard as to a balance due the Veterinary Museum. The Council appointed the President, C. Drury, Esq., a Committee to look into the claim. The Secretary was requested to communicate with the several

Railway and Steamboat Co.'s with reference to carriage of passengers and freight to and from the Exhibition ; also to advertise for tenders for the printing for the ensuing year.

Mr. Parker then presented the report of the Finance Committee passing several accounts, which was carried.

The Council then adjourned, to meet in Kingston on the 12th of April, 1882.

KINGSTON, *April 12th, 1882.*

The members of the Council who were present, the members of the Eastern Dairymen's Association, and the City Council, all met at 3 o'clock p.m. at the Court House, and were driven to the Exhibition Grounds, where they thoroughly inspected the grounds and buildings, in order to consult with the General Superintendent as to what accommodation would be required.

Council met at British American Hotel at 6.30 p.m.

Members present—President C. Drury ; Messrs. Carnegie, Legge, Shipley, Rykert, McKinnon, Aylesworth, Graham, White, Morgan, Secretary Henry Wade, and General Superintendent A. H. White.

The minutes of the last meetings held on the 23rd and 24th of March, in Toronto, were read and adopted.

The President, in his opening remarks, explained that he and the Secretary had waited on the Hon. Mr. Wood, Commissioner of Agriculture, in reference to the alterations in the Agricultural Hall, and other matters, and he had suggested that the Government do all the work in connection with the changes already agreed upon, and that they make an estimate of the portion agreed to be paid by the Council, which could then be paid by the Council to the Government. He also laid upon the table a plan of the alterations prepared by Mr. Tulley, the Government Architect.

The arrangement was approved of by the Council.

A list of requirements for the Provincial Exhibition was presented by the Superintendent and discussed by the Council and decided on. They then adjourned, to meet in the City Council Chamber at 7.30 p.m. The Council proceeded, pursuant to resolution, to the Council Chamber, and met the following gentlemen of the City Council :—His Worship Mayor Gasken ; Aldermen R. J. Carson, Downing, C. J. Gildersleeve, Quigly, Creegan, J. Carson, Smythe, McCammon, McGuire, J. P. Gildersleeve and Little. Sheriff Ferguson and Mr. Isaac Simpson were also in attendance.

The President of the Agricultural and Arts Association presided, and in his opening remarks said that they expected to have as good an Exhibition in Kingston as had been held in Ottawa in 1879, and that his Council had based their estimate of requirements on the accommodation given then, which was less than was required in the western cities. After the Secretary read the list of requirements, the President said that it was customary that the City Council give a promise or guarantee that they should be made. After a short discussion the City Council withdrew to discuss the matter.

A discussion then took place on the requirements from the City of Kingston. The Council then returned, and the Mayor announced that he had been authorized by his Council to guarantee that the list of improvements submitted would be furnished.

Mr. Weld, of London, who was in attendance, addressed the meeting on the subject of accommodation for the visitors to the City of Kingston during the Exhibition, and made some sensible suggestions.

A letter was read from Mr. Weld stating that this year he would give, on behalf of the *Farmer's Advocate*, another special prize of $100 for the best herd of cows, particulars to be furnished hereafter.

A letter was also read from the Commissioner of Agriculture to the President, stating that he had been waited upon by a deputation from the Industrial Exhibition, complaining that the date on which the Provincial had fixed for its Exhibition would clash with that already appointed by them, and stating that he made no suggestion, simply informing the Council he had been waited on, and left it with them to act as they thought proper under the circumstances.

The *Farmer's Advocate* prize of $100 for best herd of cows was accepted.

A deputation from the Eastern Dairymen's Association then entered the Council Chamber, and the President stated that they had passed the following resolutions: "That their Association grant $250, to be given to the Treasurer of the Provincial Exhibition to assist in holding a Cheese and Butter Show in the city of Kingston next September, with the understanding that the Provincial give an additional grant of $500 to assist the said exhibition;" also "That the sum of $100 be granted to assist in the manufacturing of cheese and butter at the time of holding the Provincial Exhibition." The deputation then retired.

The revision of the prize list was then commenced, and the following Committees appointed: (1) Horses—White and Moore; (2) Cattle—Shipley and McKinnon; (3) Sheep and Pigs—Hunter and Legge; (4) Poultry—Parker and McKinnon; (5) Implements—Morgan and Parker; (6) Arts Department—Carnegie and Rykert; (7) Horticultural Department—Rykert and Graham; (8) Agricultural Products—Aylesworth and Hunter; (9) Dairy Products—Aylesworth and Shipley; (10) Judges and Delegates—all the Council. It was also resolved that the Judges, on every class but live stock, commence their duties on Tuesday, the 19th, and that the Judges on live stock commence on Wednesday, the 20th of September. The appointing of Superintendents for the Horticultural and Arts Departments was left to the Committees of those departments.

The Council then adjourned until 9.30 a.m. Thursday.

KINGSTON, *Thursday*, 9.30 *a.m.*

The Council again met in the Council Chamber pursuant to resolution; same members present; the President in the chair.

A telegram was read from the Hon. Mr. Pope in regard to the $5,000 grant, in answer to one from Mr. Rykert asking the conditions of the grant.

A resolution was also read from the Eastern Dairymen's Association as follows: "Resolved that, whereas the Council of the Agriculture and Arts Association of Ontario have fixed the day for holding the thirty-seventh Provincial Exhibition in the City of Kingston, commencing on the 18th of September next, and whereas this Association have agreed to hold their Cheese and Butter Show in connection with said Provincial Exhibition, it would cause great inconvenience if the above date were changed. Signed, H. Ashley, Secretary, Kingston, April 13, 1882."

It was then resolved that the President (C. Drury), John Carnegie, and Ira Morgan be a deputation to go to Ottawa and wait upon the Minister of Agriculture, and consult with him as to the distribution of the Dominion Grant, in order to complete our prize list as soon as possible.

Mr. Carnegie then presented the Report on Finance and Printing, and recommended that the contract for printing from April 1882 to April 1883, the items for which tenders were advertised, be awarded as follows: to the *Mail* Printing Company, items 1, 2, 3, and 32, 33, 34 and 35; to E. J. B. Pense, of the Kingston *British Whig*, all the other items, viz., from 4 to 31 and 36 inclusive, as per Schedule. He also recommended the payment of a few accounts. On motion the report was adopted.

Mr. Morgan then presented a report from the joint committees on Dairy Department recommending changes which will appear in the prize list. This resolution was also adopted. It was then resolved that the Secretary send blank certificates to the different Electoral Agricultural Societies throughout the Province to be filled up by the President and Secretary, with the names of the delegates duly appointed at the annual meetings, and on the presentation of such properly filled up certificates, our Secretary shall furnish such delegates with complimentary coupons for two days admittance to the exhibition, and to take part in the annual meeting.

The Council then adjourned until two o'clock, to meet in the British American Hotel.

The rest of the prize list was then gone carefully through, with the exception of the Dairy and Horticultural Departments. The following officers were also appointed, viz.:

Consulting Chemist, Professor Dubois, of Queen's College, Kingston ; Reporter of Live Stock, Professor Brown, of the Agricultural College, Guelph.

Three new rules were also adopted : (1) One making it necessary for exhibitors of horses to remit for each stable required at the time of entry, instead of getting them from the Superintendant on the ground as formerly, in order that a catalogue can be prepared ; (2) That 25c. each entry be charged for Poultry in Class 26 ; (3) That the following clause be added to rule 29 in the Prize List, " That no judgment shall be reversed on a question of merit."

Mr. Carnegie then presented the report of the special committee on the letter from Hon. S. C. Wood, Commissioner of Agriculture.

The Committee to whom was referred the communication of the Hon. S. C. Wood, beg leave to report that after a careful review of all the circumstances they cannot recommend any alteration in the date fixed for the holding of the current year's exhibition. In arriving at this conclusion your Committee would remind the Council that in many districts of the Province it has become the practice of the various district and local associations to hold their exhibitions in a well understood order of rotation immediately following the Provincial, and that, owing to the large number of these exhibitions now held, it is highly desirable, in their interests, that the Provincial should be held as early in the season as circumstances will permit. Moreover, your Committee understand that the managers of the London and other similar associations, after kindly waiting your selection of the date for your exhibition, have, or are about announcing their exhibitions for the following and last week in September, and the county and township societies their shows for the first and second week in October ; and, also, that the curtailment of the present year's Provincial Exhibition to one week, and the selection of the third week in September, has given great satisfaction throughout the Province, inasmuch as it will enable the district and local associations to complete their series of exhibitions before the last days of October, without unduly interfering with one another, or with the Provincial ; and your Committee venture to think that it is the duty of the Council of the Agricultural and Arts Association to consult the interests which they represent, rather than those of the Toronto Industrial Association.

Your Committee have also to observe that the Council, in selecting the week which they have done, have only selected the first of the two weeks which their exhibition has covered during the last two years, and that, during the last ten years, no less than five of their exhibitions have been held during the third full week in September. It is also to be remembered that the Toronto Industrial Association fixed the time for their current year's exhibition before your Council had decided that this year's show should be limited to one week, and that in making their selection they chose the second and third weeks in September instead of the first and second weeks, which they have always occupied, and to which their exhibition has been limited during the last two years : and that in pursuing this course it was the Toronto Industrial which changed the date of their exhibition, not the Council of the Agricultural and Arts Association that of theirs. While your Committee deeply regret the occurrence of anything calculated to interfere with that harmony which should prevail between the directors of the Toronto Industrial and those of the Provincial, yet they feel that they would be lacking in a proper appreciation of the duty which they owe to their constituents were they to consent to change the date fixed for the current year's exhibition in the interest of Toronto, and to the manifest injury and inconvenience of all the other exhibitions to be held throughout the Province.

All of which is respectfully submitted.

JOHN CARNEGIE, *Chairman.*

At this stage of the meeting a letter was read, just received by the President from the President of the Toronto Industrial Association, stating that they had changed the date of holding their Exhibition, now to commence on the 4th and end on the 16th of September.

The Council then adjourned.

A meeting of the Executive and Building Committee was again held by call of the

President, at Kingston, on the 17th of August. Members present: C. Drury, President; C. Rykert, M.P., Chairman; Messrs. Morgan, White, Graham, Legge, and the Secretary.

They visited the fair grounds, made suggestions to the local committee, and then held a meeting, where several matters of importance were transacted. Left orders to have a building erected for the Manitoba exhibit as the Exhibition now was to be of a Dominion character.

The next meeting of the Council took place in Kingston on September the 16th, two days before the before the opening of the Exhibition, at the Board Room on the grounds. Members present: C. Drury, President; Messrs. Parker, Shipley, Rykert, Carnegie, Legge, Graham, Aylesworth and the Secretary.

The hours for meeting during the week coming were fixed at 10 o'clock a.m., and 3 o'clock p.m. Other routine business was transacted, when the Council adjourned until Monday the 18th, at 10 o'clock a.m.

Monday, 10 a.m.

Council met at office on the show ground. Present: C. Drury, President; Messrs. White, Morgan, Aylesworth, McKinnon, Parker, Rykert, Graham, and Legge.

It was resolved that school children be admitted at ten cents a piece, by giving the tickets to the various superintendants to distribute; also, that the military band be engaged for Tuesday afternoon, for the official opening, and that the opening be properly advertised, as it is expected that the Hon. Mr. Pope, Minister of Agriculture, will perform the ceremony.

Council Room, 3 p.m.

President in the Chair. Same members present.

It was resolved that lumber be provided to cover agricultural implements.

It was resolved that Messrs. Shipley, McKinnon, Carnegie, K. Graham, of Eastern Dairymen's Association, and Professor Arnold, of Rochester, N.Y., be a committee to award the special Dominion prize for milch cows, by testing the milk and otherwise; also, that Mr. Parker be added to the Committee on Agricultural Products.

Meeting adjourned.

Council Room, *Tuesday, 19th Sept., 10 a.m.*

Present: President, C. Drury, in the Chair. Messrs. Legge, Parker, McKinnon, Aylesworth, Moore, Shipley. Hunter, White and Carnegie.

Mr. Geo. Whitfield, of Rougemont, Quebec, was introduced, and addressed the Council with reference to the small amount of money and number of prizes offered to Polled Angus cattle.

Mr. Colwell appeared with reference to the injury done to his exhibit of tweeds by the rain.

A letter was read from Mr. David Nicol, of Cataraqui, asking the Council to admit the inmates of the Kingston Asylum, which request was granted.

Meeting adjourned.

No meeting in the afternoon. It rained nearly all the time, and the Council were disappointed in the non-arrival of the Hon. Mr. J. H. Pope, Minister of Agriculture, to formerly open the Exhibition. The Hon. S. C. Wood, Commissioner of Agriculture for Ontario, visited the Exhibition to-day.

Wednesday, 10 a.m., Sept. 20th.

Present: President Drury, Shipley, Legge, Rykert, Aylesworth, Morgan, Carnegie and the Secretary.

The Committee on Cattle reported in favour of increasing the prizes on Polled Angus to the same as is given for Galloways. The judges were also appointed for Prince of Wales prize and the *Farmer's Advocate* prize. No quorum in the afternoon.

Council Room, *10 a.m., Thursday, 21st Sept.*

Present: President Drury, Messrs. Parker, Moore, Legge, Carnegie, Shipley, Graham, Winter and the Secretary.

Two more judges were appointed to act with the three already at work on Polled Galloway cattle, on account of a protest from Mr. T. McCrae, of Guelph. A number of other protests were referred to their several committees.

The meeting then adjourned to meet at the Windsor Hotel at 7.30 p.m.

Windsor Hotel, *7.30 a.m., Thursday, 21st Sept.*

Members present: President Drury, Messrs. Parker, Shipley, Hunter, White, McKinnon, Morgan, Aylesworth, Legge, Moore, Carnegie, and the Secretary.

The Report on Essays was read by the Secretary as follows :—

The Committee to which was intrusted the duty of deciding upon the merits of the essays competing for the prizes offered by your Association, beg leave to report as follows :—

On the first subject, the "Homestead," there have been submitted to us four essays. Of these we agree in assigning the first place to that contributed by Mr. David Nicol, of Cataraqui, whose essay is therefore recommended for the First Prize.

Of the remainder we unite in considering that written by Mr. John McClure, of Brampton, the best; but, as none of them are up to the standard that we have laid down for ourselves in judging, it is with some hesitation that we recommend it for Second Prize.

Of essays upon the second subject, "Manures," five have been submitted. None of these are of a high order of merit. Two are marred by an attempted explanation of the practical, on the basis of the scientific, without a sufficient extent of scientific attainments on the part of the writers.

Taking all things into consideration, we have come to the conclusion that the essay of Mr. John Smith, Jun., of Ratho, stands first, and that of Mr. M. McQuade, of Egmondville, second in order of merit, and we recommend them for the First and Second Prizes accordingly.

Before closing we may be allowed to suggest to you the advisibility of impressing upon the candidates for essay prizes the necessity of so writing that their essays shall form a valuable permanent contribution to Canadian agricultural literature, and that to this end long and careful thought, thorough mastery of the subject, exhaustiveness of treatment, clearness of arrangement, and conciseness of statement are absolutely essential; and we would further take the liberty of suggesting that the judges be in future instructed to abstain from recommending for a prize any essay that may be lacking in one or more of those characteristics to such a degree as to render it of little or no permanent value as a contribution to the agricultural literature of our Province.

All of which is respectfully submitted.

James Mills, M.A.,
Wm. Johnston, M.A.

This Report was adopted and the four successful essays, together with the Report of the Judges on Prize Farms were ordered to be printed in this Report; they will be found further on.

Also a vote of thanks was passed to Prof. Mills and Prof. Johnston, for the trouble and time taken by them gratuitously in reading and awarding prizes on the essays.

And another vote of thanks to John I. Hobson and J. P. Bull for their arduous services in acting as Judges on Prize Farms.

The President, C. Drury, Esq., Messrs. Carnegie, and Parker were appointed a Committee to meet at an early date, to arrange and certify to the awards made under the Dominion Grant, and attend to financial matters.

The meeting then adjourned.

Council Rooms, on Fair Ground, *Friday, 10 a.m., Sept. 22nd.*

Members all present, C. Drury, President, in the chair.

Owing to the fearful state of the weather, the Council decided that the sheep could be taken from the grounds at 2 o'clock p.m., and all the other live stock and articles at 3:30 p.m. Several protests were then adjudicated on, and other matters of importance transacted; the Treasurer was also ordered to commence to pay out prizes as soon as possible.

The meeting then adjourned to meet again at the Windsor Hotel, at 7:30 p.m.

Windsor Hotel, Kingston, *7.30 p.m.*

The Council met here, pursuant to adjournment.

Members present—C. Drury, President, Messrs. Carnegie, Legge, Morgan, White, Aylesworth, Shipley, and the Secretary.

Mr. Julius L. Inches, Secretary of the New Brunswick Board of Agriculture, and Mr. Henry Longworth, Chairman of Stock Farm Commissioners, of Charlottetown, Prince Edward Island, waited on the Council.

Mr. Inches, with the object of bringing before the public the fact that the next Dominion Exhibition would be held in New Brunswick, and asking our Council to help all they could in the matter.

Mr. H. Longworth was sent, by the Board of Agriculture, from Prince Edward Island, to purchase stock to take back with him. Some time was taken up in conversation of an informal and pleasant character with these gentlemen.

On leaving, they were each presented with a complete set of the Canada Short Horn Herd Book, for the libraries of their respective Boards of Agriculture.

Some protests were then decided, after which a letter was read from Mayor Gasken, of Kingston, asking for a grant towards the expenses of preparing for the Exhibition.

The Mayor also, in person, advocated a grant.

Ira Morgan, of Metcalf, opposed the grant.

It was then moved by Mr. Legge, seconded by Mr. Aylesworth, That the Council give the city of Kingston the sum of one thousand dollars.

It was afterwards moved, in amendment, by Mr. Morgan, seconded by Mr. Shipley, That the request of Mayor Gasken be laid over to the next meeting of the Council.

This amendment was lost on a division.

The original motion was then put and declared lost.

It was then moved by Mr. Legge, seconded by Mr. Morgan, That the Council of the Agricultural and Arts Association have much pleasure in tendering their hearty thanks to Mayor Gasken and the Local Committee of the City of Kingston and County of Frontenac, coupling with them the name of Mr. Newland, the Architect, for the efforts which they made to render the Exhibition a success.—Carried.

A vote of thanks, together with a small compensation, was also passed in favour of F. Elkington, Esq., Secretary of the Frontenac Agricultural Society, for his onerous services on behalf of the Exhibition.

The General Superintendant, A. H. White, Esq., and his assistants, were also thanked for their services.

The meeting then adjourned, after passing the Finance Committee's Report.

On Wednesday evening the 20th of September, the Thirty-Seventh Annual Meeting of the Council and Directors of the Agricultural and Arts Association was held in the City Council Chambers, at the City Hall, Kingston, at 7.30.

The President, Mr. Charles Drury, of Crown Hill, in the chair.

The Secretary, Mr. Henry Wade, then called the names of the Council and delegates; the following gentlemen answering to their names, viz.:

Members of Council.—District No. 1, D. P. McKinnon, South Finch; No. 2, Ira Morgan, Metcalf; No. 3, Joshua Legge, Gananouque; No. 4, J. B. Aylesworth, Newburgh; No. 5, John Carnegie, Peterborough; No. 6, Geo. Graham, Brampton; No. 7, G. Moore, Waterloo; No. 8, J. C. Rykert, M.P., St. Catherines; No. 9, Henry Parker, Woodstock; No. 10, Joseph Hunter, Eden Grove; No. 11, L. E. Shipley, Greystead; No. 12, Stephen White, Chatham; No. 13, Charles Drury, Crown Hill.

Ex-Presidents.—Sheriff Ferguson, Kingston; F. W. Stone, Guelph.

Delegates from Agricultural Societies.—Addington, L. L. Price, T. Scott; Brant North, C. O'Neill; Brant South, C. Barker; Cornwall, James Meyers, A. P. Ross; Carleton, John Kemp, John Thompson; Dufferin, Charles Scott; Dundas, Mathew D. Welland, Thomas Hamilton; Durham East, Johnston Beatty, John Foott; Durham West, John M. Joness, Robert Beith; Essex South, W. G. Baldwin; Halton, Alex. Waldie; Hastings East, Geo. Caldwell, Thomas Martin; Kingston, Michael Flanigan, Thomas Briggs; Lambton West, Geo. Lucas, A. R. McGregor; Lanark North, John Steele, Alex. McEwen; Lanark South, Samuel Wilson; Lennox, Wm. N. Dollar, N. A. Eaton; Middlesex West, James Healey; Norfork North, Oliver Jarvis; Norfolk South, Oliver Austin, Wm. Dawson; Northumberland West, W. J. Westington, Geo. Cockburn; Ottawa E. D., Arch'd McKellar, Robert Cummings; Peterborough East, John Roland, David Forsyth; Peterborough West, Joseph Walton, Henry Collins; Prescott, John Cross; Prince Edward, M. A. Peterson, Benj. Storey; Renfrew North, James Findley; Renfrew South, Donald Wood, John Stewart; Simcoe West, John Ross; Simcoe South, Daniel K. Ross; Stormont, Robert Valence, Wm. Kennedy; Waterloo North, Henry Groff, John Aldons; Waterloo South, George Barrie, John D. Moore; Wellington South, Andrew Whitelaw; York North, Erastus Jackson; York East, A. Smith, V. S.; Owen Sound Horticultural Society, Henry McPherson.

The President then read the following address:—

Gentlemen,—It has been the custom ever since the establishment of this Association, now thirty-seven years since, for the person who holds for the time being the honourable position of President to deliver an address.

Following as I do in the long line of able and distinguished gentlemen who have addressed the annual gatherings of the farmers, manufacturers and artisans of our country, I cannot but feel a certain diffidence in attempting the task laid upon me and could wish for your sakes it had fallen into abler hands.

Living as we do at a time when the various practical subjects which concern the farmers are so freely discussed and information on these subjects so generously scattered over the land by the agricultural press and other means, I feel that you will not expect any lengthy remarks in this direction.

In looking over the records of the past, I find that in 1849 the Fourth Provincial Exhibition was held in the City of Kingston, commencing, as we do this year, on the 18th of September and closing on the 21st. At that exhibition, which was considered a great success, the total number of entries in all classes only footed up to 1,429 and the total amount of prizes to $3,400.

I need scarcely point out the great advancement made since that time; the prize list this year is of the value of $20,000 and the entries are counted by the thousands, and that too notwithstanding the holding of other large exhibitions in various parts of the country.

A new generation has arisen since the period referred to. I am informed that of those who took an active part in the promotion and management of the exhibition of 1849 in this city all have passed away excepting our esteemed and venerable friend, Sheriff Ferguson, whom we are all pleased to see with us to-night.

Once more has a beneficient Providence crowned the labours of the husbandman with a bountiful harvest. We are now in a position to estimate with considerable accuracy the result of the operations of the past year. The wheat crop is an unusually large one, both in acreage and yield. In some parts of Ontario there are instances of fifty bushels per acre, and the surplus for export from this Province will be much larger than usual. Barley, oats and peas are also a good crop, but the quantity of the latter grain grown is not increasing, owing to the spread of the pea bug, and indeed in many parts peas are not grown at all.

While the quantity of grain in the country is unusually large there can be no doubt but that serious damage was caused by the unusual amount of rain in harvest time. The hay crop is, I believe, generally good and saved in fine condition, a circumstance of great importance when we consider that all kinds of straw will this year be of little value for feeding purposes. With average prices for the various products of the farm this should be a year of moderate profit to our farmers. I cannot pass from this portion of my subject without referring with pride and pleasure to the rapid development of the live cattle trade with Great Britain. More than 50,000 head of cattle were shipped from the Dominion during 1881, the larger part being the product of our own Province.

Estimating the average weight at 1,250 pounds (although that is probably too low) and the price at five cents per pound, we find that more than $3,000,000 was paid to our farmers for cattle to supply this trade.

With the permanency of the British markets assured, and a climate particularly healthy for cattle and sheep, there would seem to be no good reason why this trade should not be rapidly developed.

During the past summer the scarcity of farm labourers has been keenly felt in all parts of Ontario. I regard this as the natural result of the present system of employing help upon our farms.

With the commencement of haying every available man is wanted, and the supply is always insufficient until after the close of harvest; but no sooner is the last sheaf safe in the barn than the larger part of the hired help is dispensed with and the supply of labourers is greater than the demand.

Few farmers pause to consider what is to become of these men during the next six months. Formerly most of them found occupation in lumbering, but this source of employment is not so large now and many of our best men have difficulty in getting steady work during the winter. Would it not be better for all parties if the custom of engaging men by the year and providing comfortable cottages for them were followed in this country.

With the exercise of a little ingenuity profitable employment might be found during the winter months and men could be got for reasonable wages for the whole year. So long as the present system is followed the scarcity of labourers in our harvest fields will be increasingly felt.

In consequence of the experience of the last year or two our farmers are carefully examining the labour-saving machines that are being introduced to our notice, and at this year's exhibitions no machine has attracted so much attention as the self-binding reaper, and present indications would lead us to conclude that within the next few years this machine will come into general use.

A new feature in this year's work of the Association will be the Report on live stock from Professor Brown of the Agricultural College.

In treating the subject of different breeds of cattle and sheep in Ontario, it is proposed to show how they are distributed by districts and where they can be found; the date of their introduction; the number in the principal herds and flocks; from whom they have been imported; the names and registered numbers of the most prominent bulls; the various families of the several breeds, and the number of breeds in the Province.

The present year's exhibition at Kingston will be taken advantage of by which to criticize the stamp of the several breeds of cattle and sheep—Ontario products especially—at the same time noting recent importations.

The characteristics of breeds will make up a special chapter with a sketch of their standard points.

The progress of breeding in the Province since 1850; the present value and probable outcome of the thoroughbred herds and flocks of Ontario; how blood and character is upheld; the proportion who exhibited; our principal markets, and, in short, such a report as will exhibit the whole standing of our herds and flocks in a form not hitherto attempted and for which special returns have been obtained by circulars.

BUREAU OF INDUSTRIES.

At the last session of the Ontario Legislature an Act was passed making provision for the establishment of a Bureau of Industries. As I deem this a matter of great importance to the agricultural interests of the Province a few words upon the subject will not be thought out of place.

Every prudent business man keeps books; they enable him to know the state of his affairs, whether his business interests are prosperous, standing still or suffering loss. They tell him his true position, and, if he carries on more than one line of business, they show which makes the largest returns for the capital invested and the labour expended, and which the least; in a word they show the measure of his progress or failure, and the secret of each, if he is wise to discern it. And such being the value of books, no prudent business man thinks that the cost of keeping them is money mis-spent. The fact is that he could not spend a portion of it to a better purpose.

Now, I wish to say this, that what is true of the business man is true of the whole country. There ought to be some means of knowing the business interests, and especially the agricultural interest. How many acres do we till? What grain do we grow? What live stock do we possess? What is the produce of fruit and roots? Have we a surplus or a deficit of any or all of these considered in relation to the demands of the home market? And, measured by its products, is the country moving on, standing still or going backward? These questions can only be answered by figures collected in a systematic way, and correct for every harvest year. We have heretofore depended on the census for the facts that exhibit the condition and capabilities of the country, and the rate of its progress; but as the census is taken only once in ten years its figures may or may not be reliable for guidance. The census year may be a year of expenses, of failure or of plenty, and in either case misleading. But no matter what the figures may be they are of no practical value to the farmer in the way of guiding how to dispose of his surplus products and of almost as little value in indicating what crops he can grow to make the largest profits. The Act referred to makes provision for doing every year, what the census does once in ten years. It is now in operation, and much information of a valuable character has already been collected and published.

One of the practical uses of agricultural statistics and crop reports, as given to us by the Bureau of Industries, is that they enable the farmers of the Province to foresee the tendency of prices, and so secure the largest margin of profits. The grain and produce dealers always keep well posted through their agents and correspondents, and frequently they buy up the whole stock before farmers know whether there is a surplus or a deficit. In this way they are able to make their business a very lucrative one, for no matter at what price they buy from the producer they sell to the consumer at the highest figure allowed by supply and demand. But the farmers are now as well supplied with information as the middlemen themselves, and it will be their own fault if they do not make the best use of it. We know, for instance, that the apple crop is almost a complete failure throughout the western counties of Ontario this year, and that in the eastern counties there is a prospect of a surplus. The eastern farmers, if they are wise, will themselves get the benefit of the good prices.

So too with live stock. There is a scarcity of fat cattle, sheep and hogs in almost all the counties, and we shall see the inevitable effect on prices. The consumers will not pay any more for their beef, mutton and pork because this information is given to the farmers; but there will be a fairer distribution of profits to the men who earn it, and money will do most good when most fairly distributed. There will be better stock, better implements, and better farming, and the Bureau will pay for its cost a hundred times over.

I need not wait to prove the value of agricultural statistics in showing the wealth of the country and the progress it is making from year to year. That is obvious, and especially at a time like the present when there is such a great movement of population, and where active agencies are everywhere at work to draw men away from us to the west and north-west, we need not wonder that reports of prairie lands producing twenty-five or thirty bushels of wheat to the acre should attract immigrants from Europe by the hundred thousand when we see that the same allurement is drawing our own citizens by the ten thousand. The fact is, however, that we do not really know the capabilities of this Ontario of ours. There are extensive districts that have been growing wheat every year for the past sixty years, and the produce of the harvest just reaped is shown to range from twenty-five to thirty-five bushels per acre. Is it not worth a great deal to Ontario that this fact should be known among the old world centres of population? Nay, is it not worth a great deal that it should be known to ourselves?

There is much more that could be said on this subject, but I forbear. I have said enough, I trust, to convince farmers that the collection of such statistics and information as I have referred to is a matter of the first consequence to them, and that they should encourage and facilitate the work by any and every means in their power. Let us know whether we are advancing, standing still or retrograding!

I must also call attention to the splendid exhibition of Manitoba's productions in the handsome building, which is a model in its way, and I am glad to say will be left as a legacy to the City of Kingston, to keep them in remembrance of the Dominion and Thirty-seventh Provincial Exhibition now being held in their midst. The greatest skill and taste have been shown in the arrangements of the collection inside the building, which consist of grain (wheat in particular), flour, roots of all descriptions, native grasses and seed, samples of soil from different parts, new and revised maps of the vast country, minerals in abundance, specimens of the different woods, furs (quite a collection), vegetables of all sizes and descriptions (immense in size), manufactures, dairy products, and last, but not least, sunflowers of immense proportions to do honour to the æsthetic taste. This entire exhibit was collected in an incredibly short time by the untiring efforts of Acton Burrows, Deputy Minister of Agriculture for that Province, assisted by Messrs. R. R. Keith and James Riddel, the Dominion Government setting aside one thousand dollars towards the collection and transport of these articles, which I am credibly informed will not nearly cover the expense.

I desire also to call your attention to important changes and amendments in the Agricultural and Arts Act made at the last session of the Legislature, referring however only to those of most importance to us. Notice first, that all *ex-officio* members have been removed from the Council of the Association, except the Commissioner of Agriculture. The Council now consists of elected members only. The object of this change is two-fold.

First, to lessen the expenses of management.

A feeling of dissatisfaction had existed in the country for some time on account of the increasing expenses. The Council endeavoured in every way to reduce those expenses, but with only a measure of success. No doubt the Board was larger than there was any need for, and this amendment has reduced the number by more than one half, although we have lost the assistance of a number of able gentlemen by the change. It will be for the farmers of the Province to elect, as members of the Council, only such men as can be relied on to carry on the affairs of the Association with vigour and success. This change was also designed to remove the growing dissatisfaction arising on account of the fact that there were more *ex-officio* members than elected, and thus the agricultural interests were not fairly represented.

Hereafter the Council will be required to submit an estimate of the sum of money required to carry on the work of the Association during the year, and the grant will be made in accordance therewith.

The mode of electing members of the Council has been changed, and the system followed in previous years of electing the members of the Electoral Division Societies at their annual meetings has been restored, experience seeming to prove that that was the better way.

The holding of an exhibition is no longer compulsory, but a wide field of usefulness is opened before us, and if in any year it is not deemed advisable to hold an Exhibition, then the Council may take up such other work as they may deem best suited to advance the interests of agriculture.

Any one carefully looking into the Act, as it now stands, can easily see that the powers of the Council are such that they may devote their energies in many other directions other than in Exhibition, the necessity of which is not now, perhaps, as great as in former years.

I desire here to say that, in my opinion, the method of conducting many of the large exhibitions of the country is not such as is likely to promote the best results, viewed from an educational standpoint. The object of an exhibition is instruction, not amusement. When, therefore, you gather thousands of our people together upon our show grounds for the purpose of instruction, is it wise to divert their attention from the more useful features, by introducing horse-racing and other exciting means of amusement, the result of which is that thousands of visitors pay little or no attention to the more useful if less exciting features of our exhibitions.

Whatever course may be pursued by others, the Council of the Provincial Association will adhere to the methods found to have been so useful in the past, endeavouring to make our Exhibitions instructive, leaving it to others to cater for the amusement of the public, a course which, we believe, will receive the hearty approval of the large majority of the farmers of our country.

CHARLES DRURY, *President.*

On motion of John Carnegie, Esq., seconded by Stephen White, Esq., a vote of thanks was unanimously given to the President for his able address.

The President then stated that the question of holding an exhibition next year might be discussed, although the audience, he supposed, was aware that the Association was not compelled, as heretofore, to hold one.

It was then moved by E. Jackson, Esq., of Newmarket, seconded by John I. Hobson, of Mosborough, that the Provincial Exhibition is still appreciated, and that it is desirable to hold another in 1883 as usual.

This resolution was ably supported by Sheriff Ferguson and other gentlemen.

The President said the Council wished to know if the farmers of the country, here assembled, considered that the Provincial Exhibition could still do good work.

The resolution was carried unanimously amid much enthusiasm.

The Secretary then read a letter from the Mayor of Ottawa, transmitting a resolution of the City Council guaranteeing plenty of accommodation for the Provincial Exhibition for 1883. Also one from the Mayor of Guelph, guaranteeing the same.

Dr. St. Jean, Mayor of Ottawa, then spoke in favour of his city, and promised that if they should come, the city would purchase the grounds, so that a locality would be permanently secured.

Mayor Slemin, of Guelph, in a very able speech, advocated the claims of the Roya City, and promised that every accommodation would be provided.

Mr. Woodburn and Ald. Cummings spoke in favour of Ottawa.

Mr. David M'Crae, of Guelph, in a very forcible speech, urged the claims of Guelph, said it was in the very centre of the principal stock county in Ontario, and now that Toronto had refused to accept the Exhibition in its turn, Guelph was the place to be made the fourth in rotation.

Ald. Gowdy also spoke in favour of Guelph.

The President closed the debate by saying that the final decision of this question was now in the hands of the Council, it would not be decided to-night. They, however, might rest assured that the Council would carefully consider the matter, and that their decision would be based only on what they thought to be in the interest of the Agriculturists of the Province.

At this stage of the meeting Prof. Brown, of the Ontario School of Agriculture, read the following paper :

SCIENCE AND PRACTICE IN THE PRODUCTION OF BEEF AND MUTTON.

It is not a new subject to the civilized world, and not a common one at such a meeting as this to speak about Science and Practice in the Production of Beef and Mutton. It is to be regretted that a branch of science so intimately related to the more prominent necessaries of human life has not received some attention at the hands of bodies of men associated for the purpose of advancing science at large. It has been left to individuals, and while some have almost revolutionized the profession of live stock, as, for example, Sir J. B. Lawes, of England, it is no excuse for its non-recognition elsewhere. Have farmers been invited to co-operate, or to be taught in the more difficult lines of this study by our leaders of Agricultural thought? I think not.

It is not known to all that the enterprising farmer of these days is not satisfied with a knowledge of the principles of sciences that are intimately related to his profession, he desires to have the help of the pure scientist to guide him in all the daily and yearly history of every field and animal of his farm, in order to obtain the greatest amount of the most valuable produce in the shortest time, and at the least cost.

Permit me then to submit to this eminent body of practical men, what, in my opinion, are the present position and requirements, scientifically and practically, of our work as producers of beef and mutton.

The primary, most simple, and most natural, and probably the cheapest view, under most of the conditions of these products, is by grazing. Of course, when early maturing and heavy weight are properly valued, pastures, natural and artificial, may not always take this position, and the circumstances of class of animals and physicial conditions of a country come in to affect the whole question.

Nature does usually provide all needed by her own animals, as in the case of the buffalo in this country, and wild sheep in several parts of Europe, but when a man tries to obtain equal results, so to speak comparatively, by the introduction of entirely different animals, without due regard to the scientific bearings both of movable and immovable matter he invariably retires disappointed. Very few consider that the present aspects of the great grazing lands of America must change, and that that change will be a deterioration unless some men are wise from the beginning. Science in the past tells of rich grazings that became almost valueless by unskilled de-pasturing, as well as those yet healthy by reason of associating with their practice the able teachings of science.

So then, my subject is not alone concerned with our beef and mutton supply as obtained through the more cultivated forms of husbandry; at the same time, the plough and its associations mark that phase of it which is most interesting to most men, and afford the greatest field for scientific help, and to it I shall therefore direct your attention.

We said, "the greatest amount of the most valuable beef and mutton in the shortest time, and at the least cost." These are the aims of the modern agriculturist, and accordingly it is with him practically a question of how much flesh can be produced per acre under the conditions of his special subject. The maximum realization of this implies a very great deal of skill, even when backed with plenty of capital, because it is not only the selection of the best kinds of animals, a knowledge of their capabilities, and what foods would most surely contribute towards the result, but the being able to produce, *within his own command*, all these foods in such abundance, of such quality, and so cheaply as must support the other end of the story.

Who shall declare that this is not more difficult than the deepest mathematical problem, or less so than some other unfledged point in science?

As a business problem, it is desired to produce quantity and quality at a certain price within a given time. It is now allowed that three years for cattle and one and one half year for sheep should be the limit of the maturing, or it may be, the pre-maturing periods commercially. Experience is gradually confirming this, and yet science has not said whether such comparatively young flesh is as good for human food as the older products. It is likely that no chemical differences exist between two animals of precisely similar character, with the exception that one has by "pushing" been made up to 1,500 pounds at two years, and the other just the same weight at three years? This is not a question

of appearances, or palatableness, it is one of much higher significance—the nutritiousness and healthfulness of food for man's daily wants.

In this relation it is evident that two elements are concerned—the class of animal that by its kind will give the weight and quality, and the foods that in kind and quantity will enable the cattle beast or sheep, to do so.

But the cost of production is, of itself, a subject of keen interest between science and practice; where it begins, and where it ends is not yet so very clear; nor do we all agree as to what it amounts to; or what should, or what should not, go to make it up. When the subject is one only from nature's upbuilding, as is the case of pasture, the debiting and crediting are much more simple.

In all my experience I have never seen two men agree on this uneven field called cost of production. We could employ much discussion on the many items from birth to the time when, in the Canadian practice, it is usual to put up the animal for finishing; when as we know, store cattle and sheep are considered to be worth only so much per pound live weight. My purpose will, however, be better served by noting the relation of the finishing process in the stall to the cost of production.

As the result of my farm cropping, I am in possession on 1st Oct. of so much wheat, hay, straw, mangolds, turnips, peas, oats, and corn. These are required for two purposes: the maintenance of my household, and the maintenance of my farm and their connections; the one is the primary necessity, the other is but secondary in the sense of being essential to human existence. I could dispose of every particle of these products and live well, as many now do who cultivate virgin soil, who indeed cannot do better, because nature's virtues need no upbuilding; but I am cultivating old land, which, like all such subjects, is now more of an agent to convey food to plants than being in possession of food naturally for the purpose. I am therefore obliged to arrange for the return of so much of the same or other materials to the soil in such form as experience has proved to be the most suitable for every requirement; these I need not detail here, except to note that farm yard manure of the very best character is absolutely essential to the best production of crops of all kinds; *nothing else can take its place.*

In making this fertilizer I am concerned in three things; the kind of crop, the class of animals, and the mode of treating what the animals give me after eating the crops It is possible I might make a mistake in the view of many good men, were I to grind and feed the wheat to cattle. Are you aware that we can produce it as cheap and purchase it in the common market at no greater cost than other things we do feed to cattle? Linseed cake costs as much, and other grains little less. Why, then, do we not give this staff of life to our fattening cattle and sheep? Just because it is, comparatively, for example, one-third less valuable as fattening food, and more than one-half less valuable in giving farm-yard manure. Why, the sunflower is just as good for food, and meadow hay as good for manure-making as the grain of wheat.

In making my winter arrangements I am also concerned, I said, in the class of animals through which to invest these field products. I may want milk and growth of bone in addition to the manure. In this case experience says that the manure will come off third-rate, it is simply impossible to get milk, grow young animals, and at the same time secure first-class manure. On the other hand I do not want aged animals because they would cost too much per pound, are slower at flesh-making, and practically I cannot get them in these days of high pressure.

Under all the circumstances of the case then, I make choice of yearling steers—one-year old on the 1st March last—that have been well done to since birth, and that from the last five months' run upon permanent pasture come to stall weighing 1,050 pounds per head on 1st Oct. Such animals of the proper beefing stamp are already well built in bone and muscle, and require eight months' science and practice to finish for market—the object being to make them 1,500 pounds for shipping on the 1st June next, and secure at the same time eight to ten tons of the requisite manure.

The financial story now begins; the 1,054 pounds cost me $47.25 at 4½c. per ℔., or 1½c. more than it cost the producer. That it cost the producer this sum is easily ascertained by following the history of the calf up to the time we bought it. The first item of debit is certainly the service of the sire, which on an average cannot be put at less than $2;

the calf gets, or should get, half the mother's milk, which for five months—not less—is worth at least $9.50 ; and to make the right kind of calf it should also receive extra food during milk, thus adding $2.50 more to the cost. After weaning and until twelve months old, the animal is treated to regular diets of green fodder, or hay, with roots, bran, and grain ; these calculated at cost of production will make $7 ; then as a yearling, partly in the stall or shed in winter, and partly on pasture for the next seven months, up to 1st Oct. will equal at least $12 ; so that food alone costs $33, as it ought to be, as it must be, under the simplest matters of business. But there are other items : the bedding, attendance, and risks are, on an average, not less than $4.50, so that we have a sum of $37.50, as the gross cost of a nineteen months old store steer that weighs 1,050 lbs. But gross cost is not net cost ; in the building up of these 1,050 lbs. of flesh, towards which everything we can think of has been properly charged, all the materials were not made use of by the animal ; the refuse called farm yard manure belongs to it, and certainly not to the former after the way the account has been made up. Valuing, for the kind and quantities of food consumed, upon both a scientific and practical basis, now fairly well established by experience and experiment, this refuse is worth $7, thus reducing the net cost to $29.90, or three cents per pound. In addition to the manure profit the producer expects and is fairly entitled to a real cash profit on the whole transaction, say, twice the manure value, or one and one half cents per pound. Remember, that in charging the foods it was at actual cost, and not the value of them in the market, which would have been a profit. Altogether, then, we think the $47.25, or four and one half cents per pound paid for the stall steer is reasonable for both parties.

By what now then am I to be guided in the finishing of this animal ? What shall the food be ? What shall the surroundings be—what the management, in all their important details ? What do science and practice say ?

Unquestionably, Ontario conditions call for housing of a very superior character, and this is always the first consideration in any mode of farming ; but particularly the fattening of live stock. Much money is not implied, any more than other things. We desire to obtain warmth with thorough ventilation, and this ventilation must exist without currents. It is more dangerous to stand an animal in a draught than it is to subject it to extreme cold, and I feel assured that the cause of the somewhat prevalent animal consumption, or tuberculosus among cattle, and lung disease among sheep, is due largely to sudden variations of temperature in winter—brought about particularly by the over anxiety of many men in regard to the comfort, so called, of their animals—who believe in having the thermometer at seventy degrees inside, when it stands at ten degrees outside. I think it is a clear mistake under any circumstances to shut the door on sheep—ewes just lambed excepted—and no science can convince me that an average temperature of sixty-five degrees is better than one of forty-five in winter. A damp, cold temperature causes animals to consume more food without corresponding results in growth, because very much of it is used as fuel to keep up warmth—so, not only ventilation, but drainage and proper light are necessary towards the best results. Whether the cattle beast should be tied or have a loose box, cannot for a moment be doubted, when *economical* handling of a large number is so important. Health in its fullest sense may not be always a part of stall management, but in the case of beef management, the kind of health implied by strength of muscle is not a matter of much account. No doubt the growing animal intended for beef requires a little exercise daily to promote strength ; but when ripening, the same animal only needs to be able to walk to market.

Thus far satisfactory with our fattening steer put up on 1st October, proper housing being simply so much food. But now as to the food itself. If I follow nature closely, I shall preserve nature's offering in the shape of grasses, which, in variety as is well known by properly managed permanent pasture, gives all that any cattle beast or sheep requires, both for fattening or growth of youth. But good as our fodders are in any form, whether timothy and clover, meadow hay or corn fodder, they are found to be too slow for the present purpose—they would fatten just as well as anything else, but not fast enough. True, the best pastures of the world under the best of conditions, will give a greater daily increase than any other form of food, but we are in Ontario and the time is winter.

I know, at the same time, that my fattening subjects are ruminating animals, and

must have bulk of the rougher materials wherewith to chew the cud. The stomach must be filled with fodder, and not alone with sufficient nutritive value in small quantities, as can easily be done with other foods, such as grain. Here the theorist might easily commit a grave error, just as much as some chemists have done in assuming that certain concentrated fertilizers will grow certain crops, because they contain all the requisite foods for their complete maturing. The proper proportions and kinds of food are then points of great value in this study. We cannot set aside science in this work. Practically, foods give results according to their chemical analysis, when *combined or mixed to suit the particular animal system.* We have many examples of this one, thus: The great grain of the American continent called corn, is chemically higher than a mixture of peas and oats with that corn, yet the result in feeding is decidedly in favour of the mixture, as against the corn alone. Most foods are better in combination than alone, and the combination should be so arranged as to leave little or no waste. These are facts from the experience of many. The kinds and proportions of food to suit each individual animal exactly, so that it shall just receive the best nutritive ratio, are not so easily struck as may appear to some. If we take the corn, peas, oats, hay, turnips, mangolds, bran, with linseed cake or cottonseed cake, and look at them by their chemical standing, it becomes a nice mathematical lesson to hit the the life or heat forming materials that should accompany the flesh forming materials, so as to secure this nutritive ratio. All the foods named must be chemically balanced, and an agreement made with practice, for no amount of scientific knowledge can square off any animal's meals without a copartnership with the practical feeder. Grain, in all instances, regulates the feeding value of a diet, so that one or two pounds more or less per day, has a greater effect than larger quantities of other forms of food. It is interesting to make the memorandum here, that experimental work with live stock all over the world differs materially in special lines of inquiry, such as feeding with one kind of crop, but when taken generally, such as feeding a large variety as we are now discussing, the results are remarkably uniform.

We are often asked, how do you prepare your cattle food? Do you cut or steam, or feed rough, that is, uncut fodder and roots?

With reference to these three forms of presenting food to cattle and sheep, I think there is little dispute about the following:—

First: That uncut hay or other fodder, and roots unbroken are most healthy, though less economical—leaving more refuse.

Second: That cut fodder and pulped roots mixed a-heap, and allowed to ferment slightly, so as to draw out sugary properties, are much more economical than any other form, and well adapted to both milking and beefing.

Third: That the boiling or steaming of food for animals that chew the cud is the most unnatural, the least healthy, and does not give corresponding results in accordance with expense, unless upon the large scale.

The proposal to preserve corn as green fodder for winter, by ensilaging, carries common sense with it at any rate, whatever the feeding effects may be, and I trust to be able to talk experimentally about it next spring. When asked in what way you would prepare show animals so as to maintain health, acquire rapid weights, and uphold the manure pile, we say that loose box management, winter and summer, with prepared raw food cannot be surpassed by any other plan. Management, however, cannot be thus hurriedly dealt with.

I have never seen any ill effects from allowing animals to have all the water and salt they can take at all times, and nothing is more rational than to feed at least five times a day, giving proportionally little at a time. Because man himself feeds thrice daily it does not follow that it must be best for all other animals. The little and the often is nature's lesson. Some are often in doubt as to what is called a safe quantity of grain per day, when pushing cattle and sheep for market. A good guide is one pound to every one hundred pounds that the cattle or sheep weighs. This is sound, scientifically, because most animals eat in proportion to their weight, under, of course, average conditions of age, temperature and fatness. It is also as true in practice as it is given by lessons from nature, that change of food often is good, and yet dangerous to do so rapidly. To those who believe in a liberal allowance of turnips and mangolds, it should never be forgotten

that our winter conditions call for more cautious work than British experience, and the rule with us should be, just so much of these fleshy green fodders, along with other things, as that the animal will drink but very little water. The grooming of cattle can be easily overdone. When anxiety overruns common sense to the extent of disturbing the animals three times a day with the curry comb and brush, more harm than good ensues ; to a tied-up animal the brush is indispensable, but never rouse them up for this purpose, nor in any form but one thorough grooming daily. Judiciously done, however, this practice alone means $4 per head more when market day comes.

And now, having advanced some things already well known and believed, others known and doubted, as well as some not known and possibly disbelieved, allow me to answer the important question: Does it pay to fatten cattle and sheep under Ontario conditions ?

How very common to hear the statement, "I bought six grade steers last fall for $35 a head, and sold them in May for $75, so I have cleared $40 apiece. Doesn't that pay well ?"

What pays well ; the added weight of flesh, or the increased value per pound of the whole animal, that was bought at three and a half and sold at six cents ; or shall we say that a more advanced view was taken of the transaction, and the conversion of crops into manure, duly weighed ?

I am not a whit disposed to hold out our own ignorance as farmers any more than that of other countries, and when I say it was but yesterday, so to speak, that British farmers were taught the true commercial position of a fattening animal, we need not be ashamed of being obliged to enquire into the same question, in a new land.

It is a fact then, that no animal whatever, under any conditions, will pay for the direct increase to its weight from the consumption of any kind or quantity of food. The first view of this, to those who have not made the enquiry, appears to be a perfect absurdity, and they respond at once, and naturally so, with the exclamation : "It is impossible. What is the use of feeding at all if that is the case ?"

We have already touched upon this phase of the subject, in estimating the cost of a store cattle beast, but no details were submitted, and besides, it is in the finishing of beef that profit and loss ensue.

Take up the stall steer of 1050 lbs. that cost us $47.25. By this gradual introduction to heavy feeding from 1st October to 1st June, the average daily kinds and quantities will be about : Hay, 7 lbs.; straw, 3 lbs.; roots, 40 lbs. (mangolds and turnips); grain, 10 lbs. (corn, oats and peas); bran, 2 lbs.; cake, 3 lbs. (six weeks).

This is liberal feeding, but not extravagant, when rapid results are required—"prematuring" call it if you will. Charge these at the ordinary market rates, and the total cost of food consumed amounts to $56 dollars for 243 days. Add to this $5 for bedding, attendance, and risks, and we have $61 to place to the original cost of $47.25—thus making $108.25 as the total cost of producing a finished bullock.

What is our position now ? We have a steer that weighs 1,475 pounds, and manure weighing about nine tons.

This manure, we said, belongs to the animal meantime. Its value is not what most farmers put upon it, nor what the scientist puts upon ; but what practical experience has proved to be its value, along with the check which the chemist gives, and which always agrees with practical experience. Its value is not necessarily by weight, but largely by the foods that have been used, and so, taking all things into consideration, this manure is actually worth to the farmer the sum of $31.50, or $3.50 per ton.

Cases vary in rate of increase, food consumed, and prices realized ; but this example may be taken as a fair average.

Now mark this, with a loss of $5, without taking manure into account, we had, as it were, sold the various crops of the field to the fattening animal at market prices, and thus of course realizing a profit upon that transaction by itself. The difference between cost price and market price, on an average of things, is just about one half, so in place of charging the animal with $46, it might have been only $30.50 (allowing of course for the bran and cake which we had to purchase), or the exact cost of production. Here we hold a sum of $25.50 ($56, $30.50) which, placed opposite the $5, gives $20.50 of real cash profit, and this again added to manure, shows a total profit of $52.

The whole question of fattening, therefore, depends upon how you put the case, and value the manure.

The faster the fattening, the greater the profit, the less cost of food, earlier returns, and better flesh. Get rid of every fattening cattle beast before two and a half years, and every fattening sheep before it is fifteen months old.

It does not pay to hold them longer. Take the case of the four two-year-old steers now in your exhibitions from our experimental farm, as specimens for exportation. Had I sold them on the first of June last, when they averaged 1,500 pounds per head, and were worth $112 at 7½ cents, we would have stood well financially; but since then, through summer heat, less daily increase, about as much food, and no greater price per pound for *exportation*, we can get but $9 more per head for three months' feed and expenses. I say exportation, because for special Christmas purposes we can get much more, but the demand is limited.

I have talked more about cattle than sheep on this occasion, but not because I consider the one more important than the other.

There is no time at present to enter fully into all the bearings of wool and mutton, yet something must be said.

There are good reasons why, as yet, we are more beef than mutton or wool producers. A forest country, an arable country, a grain-growing one, oxen for working, cows for milk, the greater suitability of beef for human food, and for winter keep. These, and others have marked our past live stock history, as against Australia, for example. But mutton is now mutton amongst us, if not so much for our consumption, it is clearly so for exportation, and though wool at the present moment is not wool per pound as we like it, it is more our own fault than that of the markets.

I do not think I would have any difficulty in proving to this meeting that, to one well up in his profession, thoroughly practical and able to guide himself by the light of science, there is even in Ontario conditions more value per acre in the raising of wool and mutton, than there can possibly be in beef. I do not refer to thoroughbreds in either case, but simply to the growth of these products by the use of pure-bred males with the commoners of the country. Take a one hundred acre farm, with soil of average texture, under ordinary rotation of crops, and the best management. Choose the best stamp of grade ewes, that by their wool, roominess, and health bespeak good mothers. Use the the kind of Down ram, be it South, Shropshire, Hampshire, or Oxford, as experience has shown to be most suitable to the special physical conditions of the farm and district, and that will give just the sort of wool and mutton wanted by the present markets of the world. Feed liberally for both crops, wool and mutton, annually, lamb early, never be tempted to sell lambs to the butcher unless at twenty-five cent a pound, and sell all your produce after the first shearing, so that you have heavy weights and best quality of everything, and thus it is safe to say that your revenue will be one-fourth more per acre than to any other branch of farming.

In conclusion, I must do myself the pleasure of laying before you something quite new—never before known to anyone.

When your Council did me the honour to name me as their reporter on live stock I felt that something else was desirable besides the examination and criticism upon herds and flocks at Kingston, and while I could have made use of some statistics already gathered by our young, but vigorous Bureau of Industries, I judged it best to have something reliable through personal correspondence. I refer to the actual history, numbers, individual characteristics, and the whole stamp and standing of the herds and flocks of our Province. Accordingly, having secured through the kindness of Mr. Wade, the names of over 1,800 breeders—said to be of pure bred cattle and sheep—I issued a circular to each, and have already received returns from about four hundred of them, setting forth the kind, date of establishment, from whom established, present bull and ram in use, and the number of males and females.

I find a very considerable proportion of the 1,800 are not breeders of the thoroughbreds; that some have retired from the special line of breeding; that others cannot be found, and quite a number have not complied with my circular as yet.

However, I am already in possession of such a mass of information in regard to the

herds and flocks of the Province, as makes me view rather seriously how it should be presented for thorough and profitable digestion. Shall it be purely statistical?—which is the easiest for the writer—or should it be from a practical farmer's stand point, or would it be preferable to handle the material as a political economist?

Meantime take these important facts:—

There is only one thoroughbred bull of all ages to every one hundred farmers of the Province. Were they distributed equally every 15,000 acres would possess one bull, but they are very distinctly localized, as I hope to show you by a special map in my formal report. There are only about four pure bred cows to every pure bred bull on an average of kinds and herds, so the males are proportionately much more plentiful than the females. There are about 1,000 head of pure bred calves dropped every year, and this being the case the natural question is—What becomes of them all? As there are 50,000 farmers able to keep, and who should keep, a thoroughbred bull for their own use, it follows, allowing one-half of the calves to be males that, at the present rate of breeding, and distribution among ourselves, fifty years will yet be required to complete the bill, and this allows for no increase of farming, but a very large proportion of our thoroughbred cattle are removed from the country, and consequently, unless some great change takes place, the boy born this year may live for the next three score and ten and not see Ontario up as she ought to be in live stock matters. It is a sad reflection on our enterprise that for every 3,000 head of grade cattle, we only hold one thoroughbred!

Matters are no better in regard to sheep. For every one thousand head of grades, the Province possesses but one pure bred ram, of all ages, and consequently but one to every twenty-five capable farmers.

Were our farmers less independent than they are, were Ontario conditions less favourable than they are to the production of grain, if it were *hard* to make a living amongst us—the change from much grain to more flesh would be very much more rapid than it is. Men are doing well in the old track, and as average human nature is highly conservative in that line, our live stock interest will drag until science and practice make things more clear.

Mr. G. F. Frankland of Toronto, a large shipper of cattle, then briefly and eloquently addressed the meeting on the benefits of raising better cattle for the markets of Britain.

A vote of thanks was passed to Prof. Brown and Mr. Frankland.

At an earlier date of the meeting, the names of the successful candidates for the medals in the prize farm competition were announced, and are as below, together with the judges' report thereon; also the names of the successful gentlemen who have written essays, all of which appear below.

FARM PRIZES—GROUP No. 3.

Comprising the following Electoral District Societies, viz..

Bruce North,	Huron West,
Bruce South,	Huron South,
Dufferin,	Perth North,
Grey North	Perth South,
Grey South,	Wellington South,
Grey East,	Wellington West,
Huron East,	Wellington Centre.

REPORT OF THE JUDGES ON PRIZE FARMS, 1882.

Having been appointed judges of the farms entered for competition in No. 3 Division, and having received certain instructions to guide us in making the awards, we at once arranged to begin the work entrusted to us. The following are the instructions we received, and which we have, to the best of our ability, endeavoured to carry out:—

1. The competing farm to be not less than one hundred acres, two-thirds of which must be under cultivation.
2. The nature of the farming, whether mixed, dairy, or any other mode, to be th most suitable under conditions affected by local circumstances.
3. The proper position of the buildings in relation to the whole farm.
4. The attention paid to the preservation of timber and shelter by planting of trees.
5. The condition of any private roads.
6. The character, sufficiency and condition of fences, and the manner in which the farm is subdivided into fields.
7. Improvements by removal of obstacles to cultivation, including drainage.
8. General condition of buildings, including dwelling-house, and their adaptability to the wants of the farm and family.
9. The management, character, suitability, condition and number of live stock kept.
10. The number, condition and suitability of implements and machinery.
11. State of the garden and orchard.
12. Management of farm yard manure.
13. The cultivation of crops to embrace manuring, clearing, produce per acre in relation to management, and character of soil and climate.
14. General order, economy and water supply.
15. Cost of production and relative profits.

County of Wellington.

On the morning of the 3rd of July we met in Guelph, for the purpose of commencing the inspection of farms. As you are aware, one of your judges being a resident of the County of Wellington, which is one of the counties in this year's group, it was thought to be advisable to have a third judge appointed to assist in the work to be done in that county. Accordingly J. P. Phin, Esq., of Waterloo, having been named as third judge and agreeing to act, we began our duties by first visiting the farm of Walter Sorby, Esq. We were driven to this as well as to the other farms in Wellington. by Thomas Goudy, Esq., the President of the South Riding of Wellington Agricultural Society.

Bronze Medal—Mr. Sorby's Farm, Puslinch.

This farm is situated five miles south of Guelph. Owing to its shape (it being a triangle) there was a difficulty in having a good field arrangement, but Mr. Sorby appears to have done the best that could be done, shape considered. It comprises 153 acres—20 acres of this are bush—healthy looking, carefully preserved; cattle not being allowed to run in it, and in every way well managed. Besides this there are nine acres south-west of the buildings, which, although it may not be properly termed bush land, yet has a good deal of timber on it—this is also nicely kept and park-like. A great deal of planting has also been done, this has been well done, and what is of equal importance, it has been carefully attended to afterwards. While referring to the planting, we may specially mention a gravel ridge near the buildings; this is comparatively worthless for farming purposes, and would, under the management of most farmers, detract from the general appearance of the farm. Mr. Sorby, however, has turned it to good account by planting it with maple, Norway spruce, basswood and elm, and it will in the course of a very few

years, instead of being like a wart on the farm, be both useful and beautiful. And we might here ask the question, are there not on many farms some spots inconvenient or unprofitable to work where the same course might be followed with profit and advantage? If this was generally a little more attended to, and the work judiciously done, the appearance of the country would soon be very much changed for the better, and the farmer so improving this property would get a good return for his outlay, if not directly in money, at all events, in the satisfaction derived from adding to the beauty of his own surroundings. How often it is that we see the costly farm house and well-constructed homestead lack in that cheerful and cozy appearance, which can be only attained when nature and art work hand in hand.

This property lies well with a southern aspect; public road running along the north-east, and also on the west side; soil, a fair loam with a free sub-soil; surface water never remains above a few hours, and the land can be worked at any time when the frost is out.

The acreage of the different crops this year are: Fall wheat, 8 acres; peas, 21 acres; oats, 32 acres; meadow for hay, 39 acres; turnips, 5 acres; mangolds, 4 acres; carrots, 3 acres; and potatoes sufficient for home use. There are also eight acres in summer fallow to be sown with fall wheat. The balance is pasture, woodland, yards, shrubbery, moderate sized orchard, and extensive garden—the latter beautifully kept and containing all the different varieties of fruits and vegetables to be found in the best gardens. It might also be mentioned that there are three paddocks convenient to the barns. These useful little enclosures no farm should be without. The crops generally were good; mangold and carrots exceptionally so. The latter crop is always grown on this farm, Mr. Sorby feeding his horses freely with carrots as long as they last. He also places a high value on them as food for stock generally. Mangolds are usually fed late in the season, coming in after the turnips are done, and are found specially good for cows when giving milk. The system of field culture is to plough up sod, sow peas or oats, fall wheat after peas or on summer fallow, roots after wheat. No spring wheat or barley is grown. Buckwheat has been sometimes grown and ploughed under, for the purpose of enriching the soil, but it has not been found to do much good. At the time of our visit a considerable quantity of hay had been housed, and more was ready for raking up. The crop was a pretty fair one. The grasses chiefly sown are orchard grass and timothy. These are found suitable for the soil of this farm—yield well, and not liable to be heaved in the winter.

For the work of the farm two pair of horses and a yoke of oxen are required. One span of horses are magnificent animals, having quite a record (although yet young) as prize takers at the Provincial Exhibitions. The other span are useful looking horses; the oxen prettily matched Devons. Besides the working horses, a couple of young unbroken mares were running in the pasture. These will be entered for this year's Provincial Exhibition, and are going to be hard to beat. The stock of cattle now on hand, are twenty-two Durham grades. From twelve to twenty are usually bought for fattening. These are stall fed and turned off in the spring, the last lot having been shipped to Britain. No sheep are kept. With the exception of a little bran for the horses and milch cows, all other feed is raised on the farm, all fodder being passed through a chaff-cutter, and all turnips cut for the stock. A large number of pigs used to be raised and fattened, some years from thirty to forty, now about a dozen are kept.

This farm is exceptionally well fenced; all the ring fences, as well as many of the cross fences, are post and board. Altogether not less than four miles of this class of fence. Gates well made, and in good order; private roads; good bank-barn, with stabling for forty cattle and eight horses. Two granaries in the barn require special mention. These are completely lined with galvanized iron, rendering them perfectly vermin proof. There is no question whatever about the desired end being gained in this way; but it must be remembered that the very important question of cost has to be considered, and it is quite possible that the same result might be brought about in some less expensive way. However, this is to be said about it—when this plan is followed it is effectually done.

Somewhat of a novelty for this country is to be seen in connection with this homestead, that is a steam engine for supplying the power for working all the machinery used

in the barn and stables, including threshing, cleaning, chaff-cutting, turnip-slicing, as well as cutting wood with the circular saw. The other buildings include engine-house, with a large water tank convenient, with a capacity of twelve hundred gallons; implement shed, tool house, carpenter and blacksmith shops, carriage house, etc. All the mechanical work on this farm is done within themselves, excepting horseshoeing. The various works required in the erection of the different buildings, with the exception of the dwelling-house, having been performed entirely by themselves, and, as far as we could judge, just as well done as if skilled workmen had been employed to perform it.

It would appear to us, however, that this would not be a good plan for farmers generally to attempt to follow, believing that the farmer's time is much more profitably employed in attending to the work of the farm, and leaving for mechanics that work for which their training specially qualifies them.

The dwelling-house, with its surroundings of garden, shrubbery and lawns; the beautiful winding drive, lined on either side with stately trees of many years growth, the massive stone gate-posts, the iron gates, and the porter's lodge—is what is oftener seen at the residence of the English Squire than at the home of the Canadian farmer. It is a beautiful place, showing what can be done with good taste and ample means.

In concluding our remarks on this farm, we would say that while it is quite evident that there has been a large expenditure, more especially on the dwelling house and its surroundings—an expenditure altogether beyond the means of the ordinary farmer, who has his living to make and his family to provide for out of the profits of the farm—yet the management in the various departments, and the careful way in which all the details of the farm work are carried out as well as the cleanness of the land, indicate a superior style of farming, and although Mr. Sorby is the only competitor in South Wellington, we think he well deserves the Bronze Medal, and would advise the Council to grant him one.

Bronze Medal—G. & W. Elgie's Farm, Nichol.

Our next visit was to the farm of G. and W. Elgie, in the Township of Nichol, on the Guelph and Fergus gravel road, seven miles from Guelph. It is bounded on the south-west by the Fergus road, and on the south-east by the eighth concession of Nichol. It contains 107½ acres, all cleared. Of this about 82 acres is clay loam, with rather a retentive sub-soil; the balance is what may be termed flats, with a creek running through it, and is used as a permanent pasture. Besides this farm, another of 74 acres is worked in connection with it, one and a-half miles distant.

Considerable draining has been done. These drains have been put in with stones, although if Mr. Elgie had any more to do he would use tiles, considering the latter the best and cheapest when the permanency of the work is considered.

The farm is conveniently laid out, with a private road running through the centre, and gates opening into each field. Fences are the ordinary cedar rail, well put up, neat and trim, with not a rail out of place. Barns, stables, etc., passable, but lacking in convenience as compared with the best kind of modern homesteads. Dwelling-house is a fair average farm-house. In connection with this is a nicely kept and well-stocked vegetable garden—this Mr. Elgie, senior, has specially under his charge, and it does him great credit. The farm is watered by the creek already spoken of, and the stock in the yards and stables from a well a short distance from the barn-yard. It would have been better, as well as more convenient, if it had been so arranged that the stock could have been watered without requiring to be turned out of the yard.

The acreage of the different crops this year is: Fall wheat, 9½ acres; spring wheat, 8½ acres; barley, 8 acres; oats, 17 acres; peas, 3 acres; hay, 12 acres; turnips, 9 acres; and 1 acre of carrots and potatoes. With the exception of barley, which was rather short for the season, the crops had a fine, healthy, strong look, and will, no doubt, with a favourable season, give a heavy yield. No fall wheat has been grown for many years, until two years ago. This year's crop is after summer fallow. Spring wheat and barley usually grown after roots and peas; oats after sod ploughed in the fall with the skimmer, and the land well worked in the spring with cultivator or gang-plough and harrows. We

may here remark that on this clean and well-tilled farm the practice is the same as that alluded to in former reports of the best managed farms—that is, a great deal of horse work on the fields. We hear nothing from these men about ploughing stubble in the spring for another grain crop—or land ploughed in the fall and sown in the spring without further preparation. All the evidence of the most successful farmers, who have competed for the farm prizes offered for the past three years, goes to show that first-class tillage means work, and plenty of it. If more of our farmers would adopt this style of farming there would not be so much need of a thistle Act, and loan societies would be fewer and their profits smaller.

For turnips, land ploughed in the fall, with a deep furrow, and thoroughly worked in the spring; manure put on the surface and ploughed in; drills thirty inches apart, and turnips thinned on the drill from twelve to fifteen inches. All the fields we found to be exceptionally free from weeds; that pest, the Canada thistle, hardly to seen at all. Twenty-two cattle are now on hand; this is about the ordinary number kept. Five of these are pure Shorthorns; the remainder fair grades. Six or seven cattle are stall fed at from two to three years old. A flock of twenty ewes are wintered. These are a cross between Cotswold and Leicester, and with their lambs are a fine strong lot—plenty of carcase and well woolled. The lambs are sold after harvest, never bringing less than $4 a piece. From eight to ten well-bred Berkshires are kept.

Mr. Elgie we consider an exceptionally good farmer, and one who deserves to rank high; in fact, we do not see (bearing in mind that the farming is done for profit) how his field management could be improved upon.

Blythewood—The Farm of J. & R. McQueen, Pilkington.

Our next move was to Fergus, where we stayed over night. Making an early start the following morning, we drove by the way of Elora and Salem to the farm of the Messrs. McQueen, in Pilkington. This farm is more directly under the management of Mr. Robert McQueen, the other member of the firm working a farm on the Guelph and Elora road. Blythewood is situated one mile and a half from Salem, and, as seen from the road, is a fine looking, showy farm—the buildings and surroundings being particularly attractive. These gentlemen having succeeded in building a homestead in every way suitable for the purpose required, and of a style of architecture and general arrangement pleasing to look at, and in marked contrast to many which are to be seen where saving of money was evidently not the leading consideration in their construction. There are few farmers but what would be well repaid, when contemplating the erection a new homestead, if they spent a few days in inspecting the best models in their own section of country.

This farm comprises 200 acres, of which 155 are cultivated; 30 acres unculled bush; the balance partly cleared and broken land. The soil may be termed a rather light loam, with a porous sub-soil under-lying most of the farm.

The acreage of crops this year is: fall wheat, 12 acres; spring wheat, 8 acres; barley, 14 acres (Mr. McQueen informed us that he had 45 bushels of barley to the acre last year); oats, 18 acres; hay, 30 acres; turnips, 11 acres (these at the time of our visit had been somewhat injured with the fly, a portion requiring to be sown the second time); 2 acres long red mangolds; potatoes grown for home use; balance pasture.

The system of cropping is as follows: Fall wheat, usually on summer fallow, occasionally on pea land manured; spring wheat, after turnips—not much, however, has been grown for some years past; barley, after peas and turnips; peas, from sod ploughed in the spring with the jointer plough. A common practice is to plough up sod for peas, follow with barley or spring wheat, then take two crops of oats; summer fallow and and manure heavily for fall wheat, followed by turnips without manure, excepting 250 lbs. of salt and plaster to the acre. Mr. McQueen has found this plan followed with good results. Generally an extra good crop of wheat, with apparently no weakening of the turnip crop, as compared with the usual plan of putting manure directly on for the turnips.

The chief feature on this farm is the splendid herd of Durhams. It is needless to go into any lengthened description of the stock, for there is not a farmer in Ontario, who has been in the habit of attending any of the large central fairs or the Provincial shows, who has not had many opportunities of seeing the Messrs. McQueens' cattle, having been for many years among the most extensive and successful exhibitors in Canada. The bull now at the head of this herd is the Duke of Athol [4962], bred by Wm. Douglass, of Onondaga, and is descended from the celebrated New York Mills Herd. This bull, in 1880, took the first prize in his class at the Provincial Exhibition, and for two years took the Sweepstakes at the Guelph Central as the best bull of any age or breed.

To give an idea of the excellence of the cattle kept on this farm, and the style of feeding carried out, we may mention that six fat cattle were sold last Christmas for $800, four of these having taken the $100 gold medal at Toronto last fall.

Being such successful stockmen, it may not be amiss to briefly describe the system of feeding practised at this establishment. In raising calves they are always allowed to suck, and are usually weaned at seven or eight months old—a particularly favoured animal sometimes being left with the cow longer. They are never allowed to run with the cows, but are kept in and turned with the cows at stated times in the day. At this time they are supplied with all the green fodder, bran, and chopped oats they can eat; boiled flax seed is also fed freely with the cut stuff. A good deal of importance is attached to keeping the calves always fat, considering that not only do you get finer symmetry, but that the cattle are always easier kept in condition afterwards if they are never allowed to lose their calves flesh. In holding this view it is bearing out what every first-class stockman knows, and what a great many of our otherwise good farmers do not by any means practice.

The time they like to have the calves come is about December; the young bulls are then well developed by next season and take the market readily. The calves are always allowed to run loose the first season, and as already said liberally fed.

Cows are fed turnips, hay, and chaff, but very little meal till after calving—the object aimed at being to keep them in a thriving, healthy condition. Straw and hay are fed uncut, and turnips whole to all cattle that can break them. We may here remark that this plan of feeding straw and hay uncut is an exception to the general rule as carried out on those farms where stock raising and feeding is made a speciality, and there is no doubt whatever that where it is desirable that the land shall carry a large quantity of stock, this can only be done where all the fodder is passed through a chaff-cutter. In regard to cutting turnips there is plenty of room for difference of opinion, and while on a large farm where many roots are grown it entails a vast amount of labour, it is very questionable if a healthy animal with a good set of teeth at all appreciates the kindness; and certainly there is no question of economy to be considered in this case, except the economy of saving the labour if it is unnecessary to perform it. Of course we are aware that some breeders of high priced and fancy cattle use the argument that they do not want to have the teeth of their high priced cows worn if extra manual labour will save them. But is not this running it just a little too fine?

Three pairs of horses are kept. One pair of these are light, well-bred animals, and are used as drivers as well as for light work. In sheep not much is done, a small flock of twenty Leicester ewes being about the average.

The buildings include a large bank-barn with straw-house 92 by 54 ft., with root-house and stables under for forty cattle and six horses—these are paved with cedar blocks, and are in every way well finished off. The other buildings include sheep-house, pump-house, pig-pens, etc. The dwelling-house is a nice looking, well finished stone building. The orchard not large, but the trees healthy looking and well pruned and the rough bark scraped off. The trees are mostly apple, with a few cherries on which no black knot was visible. Vegetable garden in good shape. Ornamental cedar hedge in front of the house, with flower beds and quite a number of evergreens planted somewhat tastefully for ornament, tended to make it a pleasant looking and cheerful residence.

The front of the farm has a board fence running the whole extent; the other fences cedar rail. A private road runs from front to rear of the farm—this from the road to the buildings is 66 ft. wide, and from the buildings to the back of farm 45 ft.

Trees are planted along the front of the farm and on the side of the private road. The water supply is from a well at the buildings and a spring which never fails. This is near the private road, and is carried into a trough. This makes an excellent watering place.

The general impressions we formed of Messrs. McQueen's management was that it had a tendency to make stock-raising a speciality, somewhat to the neglect of other departments of the farm; for while their herd of Durhams gave evidence of careful breeding and good management, the buildings in every respect suitable and well arranged—their well known success as breeders being a guarantee of their knowledge of that department of farm management—yet we cannot speak highly of the general appearance of the fields. Too many thistles, and altogether a want of evenness and finish, always so noticeable where first-class management prevails.

Mr. Charles Nicklin's Farm, Pilkington.

From McQueen's we went to Mr. Charles Nicklin's, Pilkington. This farm is situated about two and a-half miles west of the Elora and Guelph gravel road. We were unfortunate in this case in not finding the proprietor at home, so we had just to see what we could for ourselves. We found the land apparently well farmed; crops medium; one field of grass intended for hay above an average; fences good, but not enough of them—two-thirds of the farm appearing to be in one enclosure, which must be very inconvenient except where soiling is carried on. We only saw five cattle—these were very fair grades. Buildings altogether inadequate for the farm, and as one of the drawbacks resulting from that state of things, all the implements were outside exposed to the weather.

As we had now finished our inspection of all the farms entered for competition in Wellington, our next move was to Guelph, and as one of your Judges was anxious to catch the 4.10 p.m. train for Hespelar, fast time had to be made, requiring ten miles and a-half an hour so as to make the connection. However, Mr. Goudy and his team of Gold Dusts were quite equal to the occasion, for on reaching the station the horses were apparently only just beginning to warm up to their work. Our work in Wellington had been made very much pleasanter than it would otherwise have been through the kindness of Mr. Goudy, who left his own extensive business to drive us round, and very fortunate we were in having such an agreeable companion.

John I. Hobson,
J. P. Bull,
James P. Phin.

County of Perth.

Driving to Mosborough we took train for Stratford the same evening. Next morning we returned to Shakespeare and began work in Perth by visiting the farm of Mr. Richard Bell.

Mr. Bell's Farm, North Easthope.

This farm lies north of and forms the boundary of the Village of Shakespeare. It contains 99½ acres—70 of which are cleared, 25 acres hardwood, balance cedar swamp with creek running through it. There is also a strong spring in the lane, from which the stock is watered at all seasons of the year. This could be very easily, and at small cost, utilized for forcing the water into the yards. The large proportion of the land is a strong clay loam, with a few acres somewhat lighter. The surface soil of the whole farm is deep—no fear of turning up poor soil or ploughing too deep. Sub-soil, clay—but below that, at a depth of about three feet from the surface, it becomes quite porous. This accounted for what appeared to us very unusual—that was, that the posts in the

straight fences remaining in position, which they never do excepting where the water gets away freely from below.

The crops generally very good; a field of fall wheat, Clawson and Michigan Amber, having the appearance of being likely to give a large return. Special mention may be made of a field of barley; this followed a crop of roots consisting of turnips, carrots, and potatoes. The land when being prepared for roots was worked and manured alike. On this season's crop, however, there is a very marked difference—the barley on that portion of the field on which carrots and potatoes had been, being very much heavier than on the turnip land. This is only bearing out what a great many of our best farmers are beginning to realize—that is, that the turnip crop is a very exhaustive one. Years ago when the land was comparatively new this was not so much noticed, but there is no getting over the fact that a great many good farmers, who have been all their lives advocates of extensive turnip growing, are now beginning to doubt the advisability of still pursuing that course, and are seeking for some other way of keeping up the fertility of the soil. Various reasons have brought about this change. One is, that in such counties as Wellington, where roots have always been extensively grown, it is found that not only are the following crops not so markedly good as when the fields are prepared in a different way as they used to be, but that the growing of roots extensively interferes very materially with the other operations of the farm, requiring as it does such a large proportion of the season's work. It is also found simply impossible to keep an average sized farm (that is in ordinary circumstances) free from thistles and weeds, and in a high state of culture through spring and fall, working alone. It would seem almost absolutely essential (especially since fall wheat has again become a paying crop in some sections where heretofore, for a number of years, it had been a comparative failure) that summer fallowing should be resorted to. Now it becomes a pretty difficult matter, in the present state of the labour market, to get a turnip crop in to right shape. A summer fallow worked as it ought to be, haying properly attended to, and the barley and fall wheat harvest got through with in right time. For those and other reasons there is undoubtedly an idea amongst many of our farmers that we have in some sections been rather overdoing this turnip business. The great danger, however, would appear to be that, in a measure, giving up growing turnips the land might be allowed to suffer if sufficient cattle food was not supplied in some other way; for unquestionably the fertility of the soil on most farms will depend on the number of pounds of beef or mutton that is made per acre; for it is a recognised fact that, under ordinary circumstances, the best and cheapest manufactory for making manure is from cattle fed at home.

The other crops all looked healthy and strong, and indicated very clearly good farming.

The cattle, of which about twenty are usually kept, are fairly good grades. The sheep, although not very numerous, are exceptionally good. Mr. Bell pins his faith to the Leicester, and is always very careful in the selection of his rams, buying from the best and most reliable breeders—two of those used in his flock, including the one now on hand, having been purchased from Mr. Whitelaw, the famous breeder of Leicesters.

The fences are substantial and well put up, a large part being post and rail and board, the balance cedar rail. The buildings, including the dwelling-house, equal to the requirements of the farm. One noticeable feature is that all manure is kept under cover. Healthy looking orchard of four acres, with a fairly good kitchen garden.

Mr. George Hyde's Farm, North Easthope—1st Silver Medal.

Hyde Park Farm, the property of Mr. George Hyde, joins that of Mr. Bell, and is situated on what is known as the 20th side line, one mile north of Shakespeare. It comprises 150 acres, of which 120 acres are cleared, 20 acres hardwood bush splendidly timbered with beech and maple—(in the wood is a living spring running at all seasons of the year)—10 acres of fine cedar: this is very valuable, and every year becoming more so with the young cedar growing where the large has been taken out. The management of the woodland your judges consider almost perfect—all decaying and blown

down timber is cut for firewood. Cattle have either been kept out or have had a plentiful supply of pasture (and either plan will bring the same result), so that now there is a magnificent growth of young timber, and the bush presents a very fine appearance, with hardly the sign of a decaying tree.

The farm in some parts is rolling, but not so much so as to make it at all inconvenient to work, and it is somewhat cut up with the cedar swamp already alluded to. The soil is a fair clay loam with a stiffish sub-soil.

The crops this season comprise about 20 acres of fall wheat—this on sod fallow ploughed up in June; 6 acres of spring wheat; 11 acres of barley,—after root crop and oats; oats, 20 acres—part of this on land which had grown fall wheat and barley last year and was seeded down, the grass being destroyed to such an extent during the winter that it had to be ploughed up, the balance on sod ploughed in the fall and cultivated in the spring; turnips, seven acres—these at the time of our first visit had been kept back badly with the fly, but have since made an extraordinary growth. Mr. Hyde informs us that this is the first year he ever had trouble in that way. He considers that we would hear a great deal less about the injury from the fly if plenty of manure were used and the land in other respects put in first-rate shape for rapid growth of the plant, considering that quick growth is of the highest importance in the early stage of the turnip. Two acres of Early Rose potatoes, and about an acre of fodder to be cut green—principally corn. This is an immense crop—the balance peas and oats mixed. Hay, 14 acres, chiefly timothy; the clover having been nearly all killed during the winter and early spring months. We also found this to be the case in all the counties we travelled in, the past winter appearing to be an exceptionally hard one on young grass. The rest of the cultivated land is pasture.

The usual mode of cropping and working the land is to summer fallow for fall wheat; the next season roots on land manured in the fall at the rate of about twenty loads to the acre; spring wheat and barley seeded down with timothy and clover following roots; oats generally grown on the balance of the fall wheat land which is not required for roots. In all cases the fields are deeply ploughed up in the fall. In working summer fallows between ploughings Mr. Hyde much prefers the gang-plough to the cultivator. The tillage on this farm is of the most perfect description, every crop and every field indicating that the work necessary in preparing the land had been done in the most thorough manner—no signs of slip-shod farming to be seen here.

About twenty cattle are kept—these are partly pedigree Shorthorns, the balance grades, all in high condition. This is a very select herd. Mr. Hyde, as well as having a good knowledge of stock, is a liberal feeder, and the prices he has obtained for his stock of late years must make this part of his farming highly remunerative.

There is one thing in connection with his stock-raising that we would take objection to, that is, raising his calves with the pail. This is contrary to the plan followed by nearly all the best stock men, and a plan which we believe is not by any means the best.

The flock of sheep consists of twenty-one fairly good grade Leicesters. A few pigs are also kept.

The homestead consists of a lot of good, roomy, useful buildings, and would seem to answer well in every respect the purpose for which they are required. Yet we must confess to have a decided preference for the modern bank-barn, with the straight rows of stables with their high ceilings, and all the modern improvements which of late years have been introduced into the best class of farm buildings as now constructed; and, while we do not say that there are no homesteads that have been built twenty-five years ago equal to the best of the present day, we do say that it has not been our privilege to see them.

The main building including barn and shed, with stabling for twenty-three cattle and nine horses, including box stalls, is 100 ft. by 76. Besides this there is another building 76 ft. long, and one 50 by 30 ft.—the latter used exclusively for hay. The horse-power is under cover. This is a great convenience, as the time in wet or disagreeable weather can often be profitably employed in threshing grain, crushing, or in cutting up fodder, which otherwise would in a great measure be lost. All implements and farm machinery when not in use are carefully housed. We did not, however, require to be

told that—implements when left standing about in all weather soon make that noticeable. It is only fair to Mr. Hyde to say that the inside arrangements of his stables were seen to the very worst advantage at the time of our visit, they having partially been torn down preparatory to a thorough remodelling of the whole.

The water is supplied at the yard from a spring that has its source about forty rods off, and is carried through pipes to the yard, keeping up a full supply all the year round.

The working teams are strong, useful looking horses, and besides these a pair of exceptionally fine colts are running in the fields.

The dwelling-house, a nice, plain, comfortable farm-house, with every convenience. Small orchard, the trees would have been none the worse if they had been pruned. Grounds around the house trim looking and nicely kept. There is also convenient to the buildings a small house suitable for a married workman. While speaking of the buildings we may mention a good idea of Mr. Hyde's, which he has put into practice in the way of having a movable fence, this to all appearance is the ordinary picket fence, but the difference is that instead of the scantlings being nailed to the posts they are bolted—two light bolts fastening each end of a twelve feet section. By this arrangement wherever the snow is liable to block in winter the fence can be very readily and quickly moved and packed away until the following spring.

The private roads, with gates opening into all the fields, are convenient and well arranged. The sides of these roads, as well as along both sides of the farm bounded by the public roads, are planted with trees; also in other parts of the farm, where trees would be either useful or ornamental.

This we consider a really well managed farm; intelligence and good judgment being brought to bear in its management in every department. No one thing appearing to be made a speciality, to the neglect of something else; here we found first-rate tillage, good and even crops, land free from thistles and weeds, a herd of cattle profitable to keep, strong, useful looking teams, implements well kept and in good order, and the general surroundings pleasing to the eye. To Mr. Hyde we award the First Silver Medal.

Mr. James Crerar's farm, North Easthope.

At Mr. Hyde's we were joined by Mr. Curry and Mr. McPherson, the former gentleman being President, and the latter Secretary of the Perth Agricultural Society. These gentlemen accompanied us on our visit to Mr. Crerar's farm.

The name of this farm is Beechridge. It is one and a quarter miles from Shakespeare, and on the same road as the last two described. There are 150 acres, divided by the public road, 130 acres are under cultivation, the balance wooded and unbroken land. Thirty acres are a light sandy loam and somewhat rolling and uneven, the remainder of the farm is heavy clay loam with a free sub-soil. Considerable draining has been done with stone. The fences are fair. Between thirty and forty cattle with a few sheep are the usual stock kept. Horses very fine. The water is supplied to the house and yards by a pump, worked by a windmill from a well. A pretty good orchard, and a very fine house. The barn buildings roomy and suitable. Part of this farm is in a pretty fair state of cultivation, the balance, or back part would be none the worse for a little cleaning up, too many thistles and some unbroken land gave it a somewhat rough look. Coming on a heavy storm of rain and hail we were prevented from giving this farm that careful inspection which we would have liked to have done.

Having got through our work in North Perth, we took train the same evening for Mitchell, it being the most convenient point to reach the farms in South Perth. Accordingly in the evening after our arrival we made arrangements with Mr. Hicks of the Hicks House to have a good team on hand early the following morning. This was all the more necessary as we had a long distance to drive the next day, and we were anxious to keep an appointment we had made to be in South Huron the next evening.

Mr. Hodgson's Farm, Township of Hibbert.

Making an early start in the morning we soon reached Mr. Hodgson's. This gentleman we found to be from home, so we had to do the best we could without him. The farm comprises 100 acres, the soil a clay loam appears under proper management capable of bearing good crops. The management appears to be fairly good, and the buildings and surroundings passable and nothing more. An exceedingly heavy crop of wheat was to be seen in one field, the other crops medium. As far as we could see there was nothing to take it out of the ordinary line of fairly managed farms or calling for any special notice.

Mr. Duncan McLaren's Farm, Hibbert.

On leaving Mr. Hodgson's our next call was made on Mr. Duncan McLaren. This gentleman's farm is seven and a half miles south of Dublin, a station on the Goderich branch of the G.T.R. There are 200 acres in the farm, 144 of which are cleared, 50 acres woodland and partly cleared, the balance black ash flats. The soil is a heavy clay loam with a hard retentive subsoil, the fields fortunately have enough of fall for the water to run freely of the surface, otherwise it would be a difficult farm to work unless thoroughly underdrained. Some draining has been done with wood and tile and more of the land would be very much improved by being treated in the same way. A small piece of wire fence had been put up about the buildings, this has been done chiefly with the view of getting rid of the snow blocks. The general fences of the farm are not up to what they ought to be, they are built of strong rails, but roughly put up and without being staked, which besides leaving them more likely to get out of repair, gives them an untidy and unfinished look.

The crops generally may be termed fairly good, thirty acres of fall wheat very fine.

Barns, stables, etc., including a brick root-house with hollow walls and plastered inside, may be set down as a fair set of buildings. Dwelling-house good, with surroundings not much to boast of, nothing done in the way of a garden, this is a great mistake for any farmer to make, no work that is done on the farm paying better than a little time bestowed on a vegetable and fruit garden.

About thirty cattle are usually kept, twelve of these are thoroughbred Durhams, the bull now in use being bred from the stock of J. & R. Hunter, of Alma, not much is done in stall feeding. Two teams are kept for the farm work, this evidently is not enough of horse power to keep a farm like this with such a strong soil in proper shape, or at all events it is not enough unless the whole farm was first thoroughly cleaned and put in good order when the labour of keeping it so would be less.

Although the management of this farm is not by any means perfect, yet it looks like a farm that considerable money will be made from in the hands of an apparently pushing man like Mr. McLaren. The weak point in the management clearly being a want of horse labour to perform the tillage in a more thorough manner, the farm being badly overrun with thistles, and outside of the question of profit, which we do not admit would be less, it is certainly much more satisfactory and pleasant, carrying on the work of the farm when the fields are clean, well tilled, and everything in order.

Mr. Alexander McLaren's Farm, Hibbert. Bronze Medal.

Going a little further down the road we came to the farm of Mr. Alexander McLaren. This farm also contains 200 acres, 130 of which are cleared and 70 acres in wood. The land is a strong clay loam, the west side having a stiff subsoil, and that on the east being a little more porous. Considerable draining has been done with lumber, the drains still working well. A number of the fences are board, and some short pieces of barbed wire, the front of the farm having a board fence.

The river Sable runs through the corner of the farm and is convenient to the buildings, giving a supply to both fields and yards.

The acreage of crops this year is, fall wheat, 20 acres; spring wheat, 5 acres; barley, 5 acres; oats, 15 acres; turnips, 6 acres, are late but healthy looking; a small piece of carrots and potatoes for home use; 24 acres hay, and the balance pasture and orchard.

There are usually ten acres of sod broken up in June and summer fallowed for fall wheat.

The stock of cattle comprise twenty very superior grades, and are a very fine lot. A few cattle are stall fed, and a small flock of fourteen sheep are kept, these are a cross between Southdowns and Leicester.

The working teams are remarkably fine horses. Mr. Hicks who accompanied us, and who is a large dealer in horses, valued one pair at $500, besides these there are three very promising colts. The barns, stables and other buildings are quite suitable for a first-class farm, everything convenient and well arranged; can tie up twenty-five cattle in single stalls; horse stable with eight stalls, besides these stables are a few nice little stables, or they may be termed large boxes useful for various purposes. This is a first-class well kept homestead. The dwelling house is a neat white brick building with verandah on three sides, general surroundings including a very fair orchard in good keeping with the buildings.

There are a few thistles, but after making due allowance for that, we would set him down as a good farmer, carrying on the work of the farm intelligently and successfully, and well deserving the Riding medal as the best managed farm entered for competition in South Perth.

County of Huron.

Mr. James Dickson's Farm, Tuckersmith. Gold Medal.

After finishing inspecting at Mr. McLaren's, our next move was to reach Dublin, in time to catch the evening train for Seaforth; with sharp driving we managed to do it and have a few minutes to spare; we had previously written Mr. Dickson that we expected to reach Seaforth by a train which left some hours later than the one we came on and intended remaining in town all night and visit his farm next morning. He however had been in during the day and left word that he would meet us, and wished us to go out and remain with him over night. Such being the case, and as his farm is only two miles from Seaforth, and an hour or two of daylight still left, we concluded to go at once, and have a look over the farm and at the same time save him the trouble of coming in for us. Accordingly we at once set to work to make arrangements to be driven out; but, while in the act of negotiating with a liveryman, Mr. Sproat, with whom one of your judges is acquainted, came along and took the whole business in his own hands, bringing a pair of horses and a comfortable covered rig, and soon had us landed at the beautiful residence of James Dickson, Esq., Castermount, Township of Tuckersmith, two miles south-west of Seaforth.

This farm contains 200 acres, 155 of which are cleared, and 45 acres of wood-land, a few acres of this is timbered with cedar and black ash, the rest birch and maple.

The Bayfield River runs through the south side of the farm and waters 30 acres which is kept as a permanent pasture. A large part of this 30 acres is good arable land, but producing as it does fine grass, it is considered more valuable as pasture land—and is rendered more so by being so well watered. A few acres of this was top dressed with fifteen loads of leached ashes to the acre, and although this was done two years ago the good results are yet very clearly marked, and what is also very noticeable is, that both sheep and cattle prefer the grass on that portion of the field; the grass is also considerably thickened and very decidedly improved. The knowledge of this fact might be of some value to farmers having land adjacent to asheries, for it was only during the earlier part of the day that we passed an ashery with an accumulation of many hundred loads lying around, the farmers apparently not thinking it worth their while to use them.

The soil is clay loam with a not very retentive sub-soil. A great deal of draining has been done, in fact wherever it was thought to be an advantage to have a drain, one was put down; and in carrying out these draining operations, occasionally springs were struck, and by good management these have been made to serve a useful purpose; for on the south side of the farm the water is carried to the yards, and runs through a trough in a shed. This stream never stops running in the winter nor yet does it freeze; it is only during the driest part of the summer season that it ever fails. The same good judgment has been displayed in carrying out similar operations on the north side of the farm; here also springs have been struck and the water carried to a line about the centre and towards the back part of the farm, making a convenient watering place for the stock in all those fields situated on that side of the property. Besides the water supply already mentioned there is a spring convenient to the buildings on the north side of the road, making it altogether an exceptionally well watered farm, and so well has the work of securing this water supply been managed that, with the exception of the river, there is not the eighth of an acre lost altogether—simply where the water runs into the different troughs, and no more. While speaking of the draining, which has been done, we may mention that in one field, on land which before being drained was nothing but a bog, but is now absolutely dry, there was at the time of our first visit a crop of Russian oats so heavy, even and luxuriant looking, that we could not imagine anything better, and if that bog was not a very costly one to drain, this year's return would go a considerable way towards paying the whole cost. The acreage of the different crops this year were as follows: fall wheat, 10 acres, half Clawson and half Reliable; spring wheat, 13 acres; barley, 5 acres: oats, 23 acres; peas, 6 acres; hay, 24 acres; one field of this was timothy, and the other mixed clover and timothy; 5 acres of turnips, and 4 of mangolds; 1 acre of carrots and potatoes sufficient for home use. Besides the land in crop there were 10 acres of summer fallow (this was going to be sown the day after our second visit with fall wheat); 48 acres in pasture; and 5 acres orchard, lawn, etc.; without an exception the crops were excellent; though, at our first visit the mangolds were backward, but nothing else could be expected owing to the early part of the season being so unusually cold, and that particular root requiring plenty of warmth and sunlight, but the next time we saw them (on the 8th September) they had made great growth, and a nicer looking and better crop of turnips, mangolds and carrots, we think it would be difficult to find.

The system of farming varies somewhat according to the nature of the soil, but the general plan which is carried out is as follows: when sod is broken up, if land is at all dirty, summer fallowing is resorted to, and the land is sown with fall wheat, otherwise it is sown with oats, or peas, or both. The oat stubble is heavily manured in the fall with twenty-five loads to the acre, for mangolds and carrots; for turnips the same quantity per acre, but applied in the spring broadcast, and ploughed in previous to drilling up. Fall wheat on summer fallow is usually seeded down; spring wheat or barley seeded down following turnips; spring wheat is preferred to barley, as almost invariably a good paying crop is grown. Last year the yield was over twenty-five bushels an acre, and hardly any year has it been less than twenty; but generally much above it. For some years past the White Russian has done better than any other variety. In growing wheat, as well as nearly all the other cerials, and also on the roots, Mr. Dickson used salt freely; the usual quantity being 500 lbs to the acre, and almost invariably has seen a marked benefit from using it; the only exception being fall wheat, where the gain was not so noticeable. Mr. Dickson's testimony in that respect being similar to that of many other farmers, whom we spoke to on the subject, it would appear that there can be little doubt that, on soils similar to those in a great part of Western Ontario, spring wheat, barley and root crops (especially turnips and mangolds) are very much benefited by a free application of salt, and it is very noticeable that those farmers who have found but little good result from using it are generally those who apply it sparingly; and it is more than likely that if, instead of putting it on at the rate of 100 lbs to the acre, they were to try three or four times the quantity the result would be more satisfactory.

Last year forty-seven bushels of barley were grown to the acre, and fifty-one bushels of oats. This year we think the oats will go considerably beyond that, for it is decidedly the finest looking crop we have seen this season, and we have seen some very good ones. Last

year the peas (small variety) were sown on the 8th of June, yielding over thirty bushels an acre, free from bugs. A quantity of last year's growth on hand at the time we were there we examined, and not a bug was to be seen. Having been so successful last year with late sowing, he has again tried it this year, having sown on the 7th of June. Now we don't want to give an opinion on this pea-bug question; we have heard a number of theories about it, and in this particular case of Mr. Dickson, while apparently it was late sowing which kept the peas being free from the bug, yet in reality it might be owing to something else; for it seems to us that we have heard of the same plan being tried frequently by others without such satisfactory results, and with such late sowing there is always a great likelihood of the crop being very much injured by mildew.

About forty cattle are usually kept; the exact number at this time is forty-one; of these twenty-three are pedigree Shorthorns, and are a very superior lot, some among them being Provincial prize takers; this year's calves are exceptionally good. The sire that has been used on this herd for the past three years is Young Udoras Oxford [6427], got by Udoras Oxford [4183] G.G.S., the Seventh Earl of Oxford [1357] 9985; this is a grandly massive animal and a good stock getter. For next winter's stall feeding are seven cattle, five of these are steers averaging twenty-eight months old, the other two are cows; for these $70 each has been refused, to be taken off the grass before harvest. There are thirty-seven sheep, a few of these are Cotswolds; ten are Shropshires, and of these four ewes and a ram are imported; the other five are their lambs. The ram was bought from H. H. Spencer, of Brooklin, and has never been beaten in the prize ring; among the prizes taken was one at the Provincial Exhibition, held last year at London; the rest of the sheep are cross bred.

The fences are in capital order, board and straight rail, all the ordinary rail fences being done away with, and straight rail fences put in their place; these fences are put up in the most substantial manner. Considerable attention has been paid to planting, and the general appearance of the farm will soon be much improved in this way. Barn, stables, and other buildings in connection with the homestead, are roomy, well finished and convenient, and specially well fitted up for the purpose required. The stables have twenty-six ordinary stalls, and box stalls, etc., for twenty more; besides these there is a bull stable, and a horse stable with stalls for six horses. The arrangement for feeding is better than what is usually seen even in the best class of stables. From the feed-room is a tramway on which a truck is used. The front of the feeding troughs fold down, making it a very easy matter to clean out troughs and put in the feed. The stock is fed with cut fodder, pulped roots, and whatever bran and meal is considered necessary; this is well mixed and allowed to ferment a little before feeding. The horse-power used for this work is in a building specially used for the purpose, so that at any time when feed requires cutting there is nothing to do but put on the horses and go to work.

The dwelling-house is a handsome two story brick building with a verandah; and standing as it does on rising ground, with its surroundings of beautiful lawns and flower plots, fine shrubbery, ornamental trees and gravel walks, tends to make it a residence that the proprietor may well feel proud of. A fresh looking well kept orchard with some of the best fruit that we have seen this season is divided from the other grounds by a trimly kept cedar hedge. Next morning after spending a couple of hours taking a second look over Mr. Dickson's farm we were driven to Seaforth, by the way of Harper Hay, a sort of suburb to that town, but which in the early days of the Grand Trunk was a rival to its now more successful neighbour. From here we took train to Goderich reaching the latter place at nine a.m., and in half an hour had made arrangements to be driven to the farms in North Huron.

John Salkeld's Farm, Township of Goderich.

This farm is situated on the Bayfield Road, about one mile south of Goderich. It consists of 110 acres. That portion of the farm on which the buildings are situated comprises eighty acres, the other thirty lie nearer the town, and were, at that period of our history so well remembered and spoken of as the time of the Russian war, when many of our towns and villages grew so rapidly (on paper), laid out into town lots by the late John

Hillyard Cameron, but now forms part of Mr. Salkeld's farm. The soil is a fair clay loam with a stiffish sub-soil; about twenty acres are wood-land, the balance cleared. A portion of this farm was at one time very soft and boggy, but is now well drained and is good arable land. The farm generally speaking is rather on the rough side although the crops looked pretty fair, the root crop above an average, very clean and well worked up. Mr. Salkeld makes somewhat of a speciality of this department of the farm, and is quite a noted prize taker at the Exhibitions, himself and family having taking fifty-four prizes at last year's shows.

Barn and other out buildings not much to boast of; dwelling-house neat and well adapted for the requirements of the farm; a rather nice garden and very good orchard, with a large variety of fruit, and a nice lot of second growth timber near the buildings added a good deal to the appearance of the place. Mr. Salkeld we would set down as a go ahead pushing farmer with a good knowledge of his business. Some parts of the farm, however, would require a good deal done to it before it could be classed as a model farm.

Mr. Blake's Farm, Township of Goderich.

Not much can be said about Mr. Blake's farm. It is a pretty good 100 acre farm of rather stiff clay loam, with a retentive sub-soil, and pretty badly out of shape.

From Mr. Blake's we were driven to Mr. Varcoe's, going by the way of Mr. Attrell's, the now well known extensive farmer in the neighbourhood of Goderich. This gentleman not only farms very extensively, but owns one of the most valuable herds of Shorthorns in the country. He began operations a few years ago by buying up Col. Taylor's herd, and since then has made very large additions; some of the late importations, we were informed, having cost for single animals as much as $5,000.

In connection with this property are large flats on each side of the Maitland River, which at the time of our visit were bearing a very heavy crop of grass, which was rapidly being converted into hay. Looking down from the high banks on which the road is situated on which we were driving, the hay-making scene appeared to be a very lively one, and brought to our mind the description of the way farming is carried on "out west." Here were all the various operations necessary in hay making to be seen going on at the same time. Mowing machines at work, hay tedders tossing about the partly dried hay more effectually than half a dozen men could do it, teams drawing in to the stacks, loads being put on and others being taken off, and all going on at the same time, and with many finished stacks in different parts of the meadow. Requiring as it does a large force of men to carry on the work in that way, it presented a lively picture of farm life which is not often seen in our little Province of Ontario.

Mr. Varcoe's Farm, Township of Colborne. Bronze Medal.

Penzance, Mr. Varcoe's farm, is situated on the Northern gravel road, four and a half miles from Goderich. It consists of 200 acres, 165 of which are clear, and the balance wood.

The east half is a pretty stiff clay loam, but has been rendered loose and friable by being thoroughly underdrained; the west half is somewhat lighter approaching a black and sandy loam mixed with clay. Over a thousand rods of under drains have been laid down, the pipes having been made of wood and of different sizes to suit the flow of water. Mr Varcoe informs us that, since his land has been drained, he can begin work from a week to ten days earlier, in the spring, as well as continuing later in the fall.

The fences are all either board or barbed wire, except around the woods and one cross fence of about twenty chains, having 500 rods of barbed wire fencing with posts eight feet apart and one board on the bottom twelve inches wide, and four wires above; besides the wire fencing there are 680 rods of board and picket fence.

There are three acres of an orchard, thrifty looking with a large variety of trees, including 100 peach trees, nectarine, apricot, quince, pear, plum, cherry and apple trees, besides which there are forty grape vines, which were heavily loaded with large clusters of grapes, and a good stock of the smaller fruits.

Considerable work has been done in the way of planting shade and ornamental trees. The different sorts planted are black walnut, horse chestnut, elm, maple, willow (the Irish green) and a few evergreens.

The stock besides working horses consists of 35 cattle, Durham grades with a Princess bull bred by Messrs Snell and Son.

Twenty-eight sheep, Cotswold and Leicester grades, with a few South-down grades. From ten to fifteen cattle are usually fattened; last winter thirty-seven pigs were fed, and pork being high it paid well.

The buildings are either all new or built within the last six years, they are well constructed and convenient. The dwelling-house nice looking and pleasantly situated.

The system of farming is somewhat similar to that practised on most of the farms visited, that is mixed husbandry governed by local circumstances. Mr Varcoe does not summer fallow much, but grows a great deal of clover and turns that under in the fall for spring crop, or in July for fall wheat, cross ploughing in August for seed.

The crops this year consist of 30 acres of hay; 50 acres of wheat; 14 acres of barley; 22 acres of oats; 4 acres of peas; and 8 acres of hoed crops; balance in pasture. This is the first farm on which we found a self binder had been used, Mr. Varcoe having used one for the last four years. From conversation with farmers we are inclined to think a great many of these labour saving machines will be bought for next season's harvest. The harvest of this year, having been so costly and tedious to take up, has made farmers more in earnest in looking about for some cheaper and easier method of handling it. The self-binder has also been so much improved upon of late years that there is now comparatively little risk in purchasing, provided the farmer sees the machine working and judges by the actual work performed, instead of allowing himself to be guided by the interested advice of agents.

We would say that, considering Mr. Varcoe only purchased this farm twelve years ago, it is a striking illustration of what labour rightly directed and farming on correct principals will accomplish; this is more noticeable as Mr. Varcoe is in delicate health, and unable to perform manual labour.

After getting through inspecting Mr. Varcoe's farm, we returned to Goderich, staying over night, leaving for Southampton next morning by the *Ontario* one of those large steamers belonging to the North-West Transportation Company's line. This way of travelling to the next point where work had to be done was very enjoyable; the weather delightful, hardly a ripple on the water, and we had the satisfaction of being on one of the fastest and finest boats on our Canadian lakes. The only place put into on the way up was at Kincardine, where it took about an hour and a half to put off and take on freight. On leaving Goderich we had on board sixteen horses for Manitoba—at Kincardine we took on thirty-four more, these were jammed into a space hardly sufficient for half the number. Quite a lively time was kept up by a couple of kickers in this lot, and their is not much doubt but that this pair will make things lively round somebody's establishment when they get out to the North-West. Noticing a horse among them very bad with the heaves, we inquired what they expected to do with him, as he did not seem to us to be worth $10, we were informed that one of the peculiarities of that climate is that "heavey" horses get all right after they are out there for a short time. The only thing about it, that seemed to us a little strange, was that we have been accustomed for the last two years to hear that part of our Dominion puffed up in such a way, and everything that could in any way tend to its advantage brought out; but we do not remember of having seen it claimed that "heavey" horses at once became sound again on reaching that highly favoured land. Surely it was an oversight.

Staying at Southampton until Monday morning, we managed to secure the services of a small boy, a pretty hard specimen of a horse, and a rickety old buggy. On seeing our equipage come to the front door of the leading hotel we protested vigorously against having to take such a turn out; but it was no use, the commercial men who had been staying over from Saturday had been too sharp for us, and had secured every decent horse and rig about the place. After about two hours driving, we reached the end of our first stage, eight miles from Southampton, there we had our little boy and his old horse properly attended to, and sent him back to his employer with his full day's pay in his pocket.

We looked out for something better to take us the rest of the journey, and this time, as it turned out in the end, we got rather *more* than we bargained for.

County of Bruce.

Mr. Adam Esplin's Farm, Township of Arran.

This farm is eight miles from Southampton, and consists of 100 acres of which eighty are cleared, the balance being chiefly hardwood bush with a little cedar. The soil is mostly a clay loam, with the back part of the farm inclining to sand. A very pretty stream runs through this part, and Mr. Esplin has displayed very good taste in leaving some of the finest of the forest trees dotted about, including some graceful looking elms on the banks of the winding stream. This portion of his property shows to fine advantage. Private road in good shape. Considerable proportion of the fences straight. Some fine planting is done along the road. The farm is divided into even-sized fields of ten acres. Crops looking well, buildings suitable. Dwelling-house nice looking, and everything about it tidy. Altogether a pretty, well managed place.

Mr. Wm. Esplin's Farm, Township of Arran. Bronze Medal.

This farm is situated in the same locality as the last, and two miles further from Southampton. As soon as we came in sight of this place we saw that we had a pretty fine farm to inspect, and after making a careful examination we were in no way disappointed. Everything about it indicated system, order, and good judgment, and a pretty high style of farming, good crops, first-rate fences, and capital buildings, with good internal arrangements.

There are 200 acres in this farm, 170 of which is cleared, the balance wood-land. There are two streams on this farm, one on the west side or what may be termed the back part, the other between the buildings and the road. The land on the west side is mixed with sandy spots probably about ten or twelve acres altogether. Somewhat of a ridge also runs partially through the farm from the west side to the north-east corner, this is also inclined to be light. The remainder of the farm is a good clay loam, with a clay sub-soil evidently more retentive than that of most of the farms inspected in Huron. This was readily seen in the fall wheat which although a very good crop on the whole was winter killed in spots where the water had not gone away. Considerable draining has been done with wood, stone, and tile, and the drains are all in good working order. Besides the underdraining there is a large open drain on the west side; this was done mainly for the purpose of straightening the creek already alluded to. On this side of the farm there is a good deal of land used as a permanent pasture, and it is watered by the stream. This pasture has a fine bottom of white clover making a rich pasture, resembling very much the splendid grass lands around Ailsa Craig. Mr. Esplin always sows Alsike along with the other grasses, when seeding down, and finds it answers a very good purpose.

The meadows for mowing were decidedly on the light side which was a matter of some surprise to us, considering the grain crops were so healthy looking.

The acreage of the different crops was: fall wheat, 22 acres; spring wheat, 5 acres; barley, 5 acres; peas, 8 acres; oats, 15 acres; and 6 acres of peas and oats mixed, which is grown for a fodder crop, and will be cut on the green side. It was sown on account of the clover having been badly heaved out last winter, and will be used to supplement the hay crop; five acres of turnips, mangolds, and potatoes, the turnips and mangolds backward, especially the latter; forty acres for hay, the balance pasture.

Mr. Esplin ploughs his land deeply in the fall. Formerly he used to use the gang plough in the spring, now he uses the ordinary plough instead, and gives it a fair furrow, but not deeply as in the fall.

Thirty cattle are usually kept, these are a lot of pretty fair grades, and in very good order. Calves all brought up with the pail, and show pretty clearly that those who

argue in favour of letting them suck the cow, because it makes the best calves, have the best of the argument. A few cattle are stall fed, but generally the surplus are sold as stockers. The sheep number about 50, these are a cross, between Cotswold and Leicester. This season Mr. Esplin intends to use a Down ram, finding that to be in the fashion it must be a black face of some sort.

The farm buildings are a specially fine set, the stables extensive, and well fitted up and convenient. In the cattle stables are stalls for forty-two cattle, and in the horse stable stalls for seven horses, besides a box stall. Root houses roomy, and convenient for the stables. The other buildings include sheep houses, implement house, and spare stables, besides those already described.

Dwelling-house, a beautiful two-storey brick, fine looking, and altogether a model farm-house. In the rear of the house is a large wood-shed, and above this is a well fitted up workshop, with all the tools required about a farm. An orchard of about two acres, and a good garden, with nice surroundings, makes this farmer's home a very pleasant looking one.

Private roads, gates, and fences are all that could be required. The fence along the front of the farm, as well as a good many of the cross fences, and all those about the buildings are of board. A number of the straight fences are made with stone, two feet high, and boards above—a great deal of stone was on this farm, and a large part of it has been used in this way, Mr. Esplin having paid one man $400 for handling stone; the rail fences are in the best possible shape. A great deal of planting has been done some years ago, all along the front and on the side road, each side of the private road, as well as along some of the short fences about the buildings.

This we consider a well managed farm in almost every respect. Land, with the exception of some lately cleared and one or two fields which have rather many thistles, may be considered clean, and we would set it down as such, for that portion of the farm having thistles is so small, compared to the whole, that we are quite warranted in classing it as a clean farm.

Mr. Esplin we consider a first-rate farmer, following out a high style of farming. The one weak point being his stock management, for while his cattle are fairish, they ought to be better—not enough attention is paid to the selection of bulls, and the calves require to be more liberally fed; what they loose in the early stage of their growth can never be made up again.

The manure management is excellent. The yards are neatly cleaned up, and manure nicely piled in square heaps, presenting little surface to the weather.

Mr. McConkey's Farm, Arran Grove, Township of Arran.

This was formerly known as the Hewitson farm; it was purchased some years ago by its present owner, Mr. R. McConkey. It consists of 554 acres, the soil varies a good deal, and the farm is somewhat broken—part of land hilly and rather bare. This portion is apparently better suited for sheep than anything else. On the east side and running along the side road is a fine stretch of land bearing, at the time of our visit in July, heavy, solid looking crops; the turnips were the best we had seen, had been well put in, and the after management had been good. A large stretch of land, with a stream winding through it, at the back part of the farm, and with plenty of shade timber makes a splendid cattle run. The grass on this land is similar to that referred to in the report on Mr. Esplin's farm, as appearing to possess the same feeding properties as that on the farms on the Huron tract around Ailsa Craig. Mr. McConkey, very wisely we consider, never breaks this up, but uses it solely as pasture. At the time of our visit, he had fifty-one steers pasturing: these were all three and four years old, and had been wintered on the farm. They were to go away in September, and would then bring about $70 per head. The plan he follows in this stock business is to buy up steers in the fall, and during the winter months run them in the yards, feed with straw or hay, with the addition of a little meal or turnips, and then sell off the pasture the following summer.

Mr. McConkey claims this to be a profitable way of handling stock on his farm, and

we quite agree with him, as on that particular farm where such a large proportion of the land could not be used to advantage in any other way than in pasturing, that it is the best possible plan to follow. The fences are strong, and in good order- There appeared to be rather a want in convenience as regards private roads. The fields large, but not too large, considering the size of the farm.

The homestead large, well constructed, and convenient. Sheep raising at one time having been made a speciality, we found extensive sheep houses, large enough to winter two hundred sheep ; besides these there are other smaller buildings that could be used if required. The arrangement for feeding in these sheep houses was the best we had seen. Among other good ideas carried out, the racks simply by moving them could be so placed as to make seperate pens of any size, and for all practical purposes equal to a stone wall. The plan of feeding is also a good one: but perhaps could not so easily be carried out on many farms, as the building above the sheep pens on this farm is used altogether for sheep feed, and there is every facility for placing the feed directly into the racks from the floor above, without in any way disturbing the sheep, or having their wool filled with seeds and dirt, which is too often the case on many farms. There are two barns, one 120 feet by 60 feet and another 96 feet by 54 feet, these, as well as all the other buildings, have eave troughs, and the water is carried away from below in a drain. The water supply at the yards is from a spring, running into a trough at the yard. This trough is well set up off the ground, and makes a good watering place.

The dwelling-house is a suitable enough looking frame building, with rather an old-fashioned look about it. Convenient to the house is a wood-shed, with carpenter's shop and tool house above. Pretty fair orchard of two or three acres.

The acreage of crops is, fall wheat, 60 acres; spring wheat, 8 acres; oats, 36 acres; hay, 60 acres; turnips, 10 acres, and 270 acres in pasture; the balance is bush, of which the cattle have the run in connection with the pasture. Three span of horses and a yoke of oxen do the work of the farm.

The system of farming generally followed is to clean with the root crop, and summer fallow from thirty to forty acres ; always seed down with fall wheat, and also the crop following the roots ; the time the land remains in grass depends upon circumstances. The leading feature of Mr. McConkey's farming is to raise large quantities of hay, and keep a large breath of land in pasture. One-half of the whole farm, 270 acres, being now in pasture, and by that means he gets his farm to carry as much stock as possible, with due regard to keeping the land clean by summer fallowing when necessary.

Mr. McConkey, in many respects, we consider an excellent farmer, and his farm, generally speaking, is in good order. He is also evidently carrying out a system of farming well suited to local circumstances. His farm, however, being a large one, it is difficult to have it all in that trim shape so necessary to make it look to the best advantage.

From Mr. McConkey's, we were driven to Port Elgin, reaching that neat, thriving little town after eleven p.m. On the road we had somewhat of a mishap. From some unaccountable cause the horses got frightened, and, in spite of our skilful driver's best efforts, rushed madly off. One of your judges, taking in the situation and remembering that he had three or four sheets of farm notes in his pocket, felt how serious a matter it might be for the Association if, in the general smash up that seemed so imminent, these notes were to get destroyed. So without any further consideration, after bidding a hasty adieu to his companions, and holding firmly on to the notes, he jumped from the rapidly moving vehicle. But misfortunes followed ; the hind wheel run over his arm and hand, his hat got smashed in, and himself badly rolled in the dust, but with the satisfaction of knowing the notes were safe. The next thing thought of was to rush after the runaway team, and to keep a sharp look out for his late companions in case they might have been thrown out and badly injured before the general smash up took place. Judge his surprise when he came up to the team standing quietly about a couple of hundred yards ahead, and his companion coolly smoking, with all the apparent *sang froid* of one who felt that the saving of valuable property did not rest in his hands.

The next morning, we were roused up at four o'clock to catch the 4.30 train to Walkerton, here we were met at the station by Mr. Miller, secretary of the South

Riding of Bruce Agricultural Society, with a comfortable covered rig. This gentleman drove us to the different farms in the riding.

The first farm visited was that of Mr. James Tolton.

Mr. Tolton's Farm, Springbank, Township of Brant.

This farm is situated five miles west of Walkerton, on the Durham Road. The farm comprises 180 acres, of which 125 are cleared, the balance woodland. The soil may be termed a free clay loam, with a subsoil of clay and gravel, water getting away freely. A large part of this farm is comparatively new, Mr. Tolton settling on it seventeen years ago, when at that time it was all wooded. A considerable part of this year's wheat will require to be cradled, and a good deal of the grass mown with the scythe on account of stumps.

The water supply is from wells on the main portion of the farm. A windmill being erected at one of the wells, from which the stock is chiefly watered in the summer; a great deal of labour is in this way saved. Sixty acres of the farm is on the south side of the road; this part is watered by a small stream.

The following is the crop grown this year: fall wheat, 22 acres; spring wheat, 10 acres; peas, 11 acres; oats, 13 acres; barley, 3 acres; roots, 10 acres—mostly turnips, with a small piece of mangolds, and potatoes for home use; hay, 35 acres, balance pasture.

The rotation is similar to that carried out by most good farmers in those sections where the growing of roots and peas is carried on to any considerable extent—that is, sod ploughed up for peas, followed by fall wheat, then oats; roots on oat stubble manured; what manure is left over is put on in the fall, the remainder in the spring spread broadcast, and poughed under as soon as it can be done after seeding. Summer fallowing is only done occasionally; so far, this farm has been kept free from weeds without it.

About thirty cattle are kept, half of these are thoroughbred Durhams, the remainder good grades. Sixty sheep; these have been until lately chiefly Cotswolds, with a few Leicesters. Mr. Tolton, like most sheep breeders, is now beginning to look to the black faces, and has lately bought a few imported Oxford Downs. This season he intends to use an Oxford Down ram on his long wools, and there is no doubt but that the cross will bring a sheep which both for mutton and wool will take the market better, the demand, both at home and for export, being for sheep with some sort of a Down cross. Ten cattle are usually fattened. There is evidently, from the quality of the stock, both sheep and cattle, kept on this farm, a good deal of money made from the surplus annually disposed of.

The homestead includes all the buildings which are to be found on a first-class farm, where stock raising is made somewhat of a speciality, and where the improved bank-barn is the style of building adopted. The stables are fitted up for thirty-five cattle and nine horses. Capital two-storey brick house, with pleasant surroundings. Two orchards, with healthy-looking, well pruned trees. Everything about this place is well attended to. Mr. Tolton is a thoroughly good farmer; but in showing his farm, is working at a disadvantage as compared with many of the other competitors, on account of its comparative newness.

Mr. Andrew Waechter's Farm, Township of Brant. Second, Silver Medal.

Mr. Waechter's farm lies on the town line between Brant and Carrick; it comprises 200 acres—155 cleared and 45 woodland. The soil is a lightish clay loam, with a free subsoil. The farm, with the buildings all new and fresh looking, and well painted, the fields square and even, and with the fences as straight as a surveyor's line, is a remarkably showy one. The system of field culture appears to be most thorough and perfect—with the exception of two fields, which had more thistles in at our second visit than we expected to have found, judging from our first inspection in July, the farm is exceptionally free from weeds. The private roads for the purpose required are in as good shape as it is possible to have them; one or two little knolls have been lowered, so that

there is now an even smooth road from every field—not a stone left lying to jar the waggons ; and why the private roads on nearly every farm are not as well attended to is more from neglect than from what it would cost to do it. The fences are rail, straight as a line, and substantially and well put up.

The barn, stables, etc., are perfect in every point, from the well-painted roof of the large bank barn to the yard fences. In the stables are stalls for forty-two cattle, and in the horse stable stall for seven horses. The barn is 90 feet by 84 feet, with an additional pea barn 36 feet by 60 feet. A pump-house at the end of the shed covers well and pump, from which a spout passes into the shed, supplying water for the stock. A noticeable thing about the stables is the roomy passages and the great convenience for feeding; the hay can be put down into the feeding room from the top of the barn mow as readily as from the barn floor; this is done by having a square opening running up the whole height of the hay mow, and so arranged that the hay can be forked into it at whatever level the hay is, and large enough, so that there is no danger of blocking up, for the hay passes freely down to a place convenient for feeding. As far as convenience and ease in performing all the work to be done about the buildings, we cannot see how it could be improved upon.

The crops consisted of 20 acres of fall wheat, this was a wonderfully fine crop ; 10 acres of spring wheat; 18 acres of peas; 20 acres of oats; 4 acres of barley; 27 acres of hay, and 10 acres of turnips—these were considerably injured after thinning with the fly ; rest pasture.

Peas are grown after sod, wheat after peas, oats following wheat, seeded down with clover that is ploughed under, with the addition of a light coat of manure next season for wheat ; next season roots, with more manure ; after roots, spring wheat or barley seeded down. Mr. Waechter generally sows clover freely with all the grain crops. This is an excellent idea, and one that might be carried out on nearly all farms adapted for growing clover with advantage.

About thirty cattle and twenty-five sheep are kept; from twelve to eighteen are stall fed. A good many during the summer are bought ; the best of them are kept for stall feeding, and the balance sold at any time when the market suits.

Besides the farm entered for competition, Mr. Waechter farms 228 acres adjoining, altogether, including 90 acres more which he owns, in all 518 acres.

Mr. Rivers' Farm, Spring Hill, Township of Carrick.

This farm is situated on the Elora and Saugeen Road, two and a half miles from Walkerton. It contains 200 acres, divided by the town line road of Carrick and Brant 150 acres are in Brant, and 50 with the homestead, are in Carrick. It is watered by a spring at the back of the buildings, this is carried through pipes, and supplies both dwelling-house and homestead ; also a spring creek crossing the north end, and another on the east side or front of the farm.

The farm is well adapted for mixed husbandry, as the fields crossed by the stream are well suited for pasture, and the arable land all lying in a block on the rising ground.

The system of cropping for some years has been to plough up sod for peas, then fall wheat, with a light dressing of manure, followed by oats ; after oats, turnips, with the land well manured, then spring wheat seeded down. When the land is found to be getting foul, an occasional summer fallow is resorted to.

The growing of grain for seed is quite a speciality with Mr. Rivers. At this time there is growing on the farm four kinds of peas, two of barley, four of oats, and five of spring wheat. These, Mr. Rivers informs us, are thoroughly tested before being offered for sale, and great care is taken that each variety shall be kept free from any admixture with other grain. The spring wheat especially has proved very profitable, the yield having increased in five years from twenty-five to thirty-one bushels an acre.

These successful results the owner attributes to a good selection of seed, the use of salt on the previous crop of turnips as well as with the wheat, and early sowing. The wheat has for the last five years been sold at extra prices to be sown all the way between Manitoba and Prince Edward's Island.

There are eight horses, young and old, besides a pony for riding and driving. There are among them two well matched spans, the others are also good animals.

The herd of cattle consists of elven head of Durhams, with a good Seraphina Duke bull; the cows suckle their own calves. The grade cattle all count from two to four crosses. There are seven cows giving milk, the calves from these cows are fed from the pail, being allowed new milk from four to six weeks, then put on grass, with skim milk and a little pea meal added; many of these grade cattle are fine enough to pass for thoroughbreds. The cows have given a return of $39.91 per cow for butter sold for the last two years, besides feeding their calves.

For winter feeding all the chaff is saved, and all hay and other fodder cut up, and mixed with pulped turnips in proportion to suit the different cattle that are fed. From six to twelve cattle are usually stall fed; these are finished off with a liberal allowance of meal added to their mixed food.

The bank barn, with stabling, is on a bank with sufficient slope to admit of an additional basement under the straw shed and driving house in front of the barn, this basement is 25 feet by 40 feet; into this the manure it dumped through two traps as it is wheeled from the stables, and the liquid manure is run through wooden drains from the stables above.

The stables will accommodate thirty-six cattle and eight horses. Root-house, the whole length of the barn, with a capacity of 6,000 bushels. Length of barn, with implement house attached, is 110 feet, width, with straw shed, 102 feet.

The dwelling-house is a comfortable looking farm-house, with every convenience required in a farmer's dwelling.

We almost omitted to mention that the flock of sheep and the Berkshire pigs, like the cattle, show careful breeding. The eight Birkshires now on hand are fine specimens of the breed; the original stock was first bought from Mr. Stone, and have been kept up by selections from the pens of the Messrs. Snell, and later from the Model Farm. The flock of sheep numbers about 80; 25 of these are Southdowns, 20 Leicesters, 10 Cotswolds, and 25 grades; taken altogether these are a good lot.

The orchard consists of eight acres of the best standard varieties of apples and other fruit. Considerable planting has been done, and there are now many fine shade and ornamental trees. The woodland has also been carefully attended; the larger timber looking fresh and healthy, and a fine growth of young wood coming on. A straight board fence runs along the front of the farm, and a wire fence along part of the town line.

The soil of this farm is mostly a limestone loam, with a clay subsoil. A portion of the farm running from east to north is rather steep and hilly, and better suited for sheep than to be kept as arable land.

Circumstances having prevented us from inspecting the farms in county of Grey upon the days following our visit to Bruce, we arranged for resuming the work on the 22nd of the month. So accordingly on that day we took train for Orangeville, reaching that thriving little town by the Credit Valley Railway; this road passes through some of the most beautiful scenery in Western Ontario. So grand and romantic is it in the neighbourhood of Church Falls and the cataract as to well repay even the ordinary traveller to go a good way round for the purpose of seeing it. At Orangeville we took the Toronto, Grey and Bruce Railroad to Markdale, a thriving little village which, like some other villages between Orangeville and Owen Sound, dates its birth from the building of the Toronto, Grey and Bruce road.

From here we went to the farm of Mr. John Ford.

County of Grey.

Mr. Ford's Farm, Mount Royal, Township of Artemesia. Bronze Medal.

On our way to this farm, which is three and a half miles east of Markdale, we drove through a poorly-farmed section. We observe here what is so often seen, and

what has come particularly under our notice during the last three years while travelling through a large part of Western Ontario, that certain leading features are often noticeable in whole sections or districts, often continuing for miles at a stretch. The leading feature being in some cases badly tilled, and as a sure result dirty, land; badly constructed and worse kept fences, and homesteads of anything but the improved style. Again, you may drive for a considerable distance, or through a considerable part of a township, where, comparatively speaking, good farming is the order of the day—fences good, homesteads well constructed and tidily-kept, fields clean and well tilled, and the general appearance pleasing to the eye. Speaking more forcibly of the effect of example for good or ill to those who witness it, than a volume written on the subject would do; showing in a most unmistakable way the influence a single good farmer often exercises in raising the standard of agriculture in the neighbourhood where he resides.

Mr. Ford's farm we found to be decidedly the best tilled one we had seen from the time we left Markdale.

It contains 100 acres, about three-fourths of which are cleared, the balance beech and maple bush. Soil, a fair clay loam with a rather gravelly sub-soil prevailing over most of the farm. Fences exceptionally good, built of strong cedar rails, part straight, the remainder the ordinary angle fence with upright stakes fastened with wire. A private road runs from front to rear of the farm, this is in good shape and well kept. On either side are fields of an even size of ten acres with well made gates opening into them. The tillage we found in every respect to be good, and the land as a consequence clean and free from weeds, with the exception of one field of barley, in which a few thistles were to be seen. This is a condition of things which it is impossible to bring about except by high class farming, when the neighbours living around have no fear of the law and treat with contempt the thistle Act.

The crops, generally speaking, were good, but not what might be termed heavy, with the exception of fall wheat which was a magnificent crop. Oats and some of the barley rather on the light side. An acre of a new variety of oats known as Egyptian looked like giving a large return. Potatoes, for home use only, are grown on this farm; but a large quantity is being raised for the market by other farmers in this section. A small patch of turnips on new land were well hoed and clean. About twelve cattle are the usual number, and no sheep or pigs.

Buildings passable, and everything about them in order; stables well fixed up, roomy implement house, large enough to hold all the implements on the farm, those not in actual use all under cover, clean and well taken care of.

This in many respects is a well-managed farm, and while giving Mr. Ford credit for doing his work in a thorough and complete manner, and showing to others the good results derived from first-class tillage, yet, we consider him weak in one, and that a very important department of farm management, that is, not taking the proper means of keeping up the manure supply. There is no use in asking the question, are a dozen cattle enough on a hundred acre farm where no sheep or pigs are kept? That is, on the ordinary clay loam soil. It is to be borne in mind that this is a comparatively new farm, and already, with all the advantages of good management in other respects, some of the fields which have been longest cleared show clearly signs of weakening. It is an established fact that there is no disputing, that it is a much wiser course to follow to keep the land in good heart by liberal manuring, than to let it run down and then have to go to work to make it up again. Mr. Ford, however, sets such a good example in many ways, and his management is so good in many respects, that although he is the only competitor in the East Riding we would recommend that he be awarded the riding prize—a bronze medal.

Our next move was to Owen Sound—waiting for an over-due train nearly four hours we reached that town about 10 p. m. on Saturday night. On Monday morning we laid our plans for a big day's work, being very anxious to finish up so that we could get home next day.

As the two farms to be inspected lay in opposite directions, and finding that it would take a forty-six mile drive to reach them, we concluded that the best way to go to work was to leave the whole matter of arranging the way of getting there in the hands

of "mine host," of the Coulson House. Accordingly, on Monday morning, we were driven by him to the farm of Robert Linn, Esquire.

Mr. Robert Linn's Farm, Township of Derby. Bronze Medal.

Our drive for the first two miles was most of the way along the banks of the Sydenham River, which here runs through a beautifully wooded and picturesque dell, forming a very lovely bit of scenery. At Inglis's mill we turned off the road to have a look at the falls. At this point a considerable body of water goes tumbling over rocks apparently about thirty or forty feet high. However, as we were not sent here either for the purpose of visiting or describing fine scenery, we soon turned back on to the road and wended our way to Mr. Linn's, going by the way of Killsyth. As we came in sight of the farm we at once set it down as the one entered for competition. This farm shows well from the road, and is a fine looking property. The front of the farm and each side of a wide avenue leading from the road to the house is fenced with a board fence, and the avenue is lined on either side with a double row of maples, and a single row along the public road. These being well grown add very much to the appearance of the farm, and with the large well painted buildings and fine surroundings marks the proprietor as a man of more than ordinary good taste.

The farm contains 200 acres, of which 160 acres are cleared. The soil is a lightish clay loam, although nearly every field appeared to vary more or less. Considerable draining has been done with lumber and stone, the lumber used being good sound cedar, cut into stuff five inches and three inches and one inch thick ; this makes a pipe of three inches. The conclusion we came to was that where tile is dear and cedar cheap the plan is not a bad one. The pipes could all be made in winter, or in bad weather, and laying them when the drains are dug is a small matter, as they are made twelve feet long.

The crops we found to be pretty fair. Turnips exceptionally good ; a field of spring wheat, after sod broken up this spring, was a nice even crop. This field had been pastured for two years previously, and was ploughed with the jointer plough. We mention this because it is something new in our experience, and while we do not say that this is a good plan to follow, we can say with a certainty that this particular field of wheat had the appearance of being likely to give a good return, and the land looked more like as if it had been a summer fallow than as if it had been directly ploughed out of sod; this, of course, was owing to the jointer plough having been used, and the work having been exceptionally well done.

Mr. Linn's system of field culture, as well as rotation of crops, being similar to that practised by most good farmers need not be gone minutely into. One feature of his farm management might well be followed with advantage and profit by many of our otherwise good farmers. That is, all manure is kept under cover, thus preventing that serious loss which always occurs where the plan followed is to allow it to lay scattered round, and then to put on the fields in the fall what is left, after having been exposed to a summer's sun and a season's rains. Thirty grade Durhams and a flock of twenty or thirty sheep are about the average stock kept.

Mr. Linn goes largely into fruit growing, his orchard extending to over ten acres. This has been planted twenty years, and has evidently been carefully attended to, the trees being in the best possible shape ; about thirty snow-apple trees, and a few Ribston Pippins, the remainder being pretty evenly divided between Northern Spy and Golden Russets. Mr. Linn likes the late varieties, as they will keep well until the latter part of the season, and having good store room and a large quantity to handle, averaging from 200 to 300 barrels, he finds it an advantage to hold them over on account of marketing being more easily done, and prices generally being a little better.

Mr. Linn does most of the pruning in March, although he prefers June, but as the farm work begins to crowd in the latter month it cannot then be so readily done. Plums are also somewhat extensively grown ; this year they are, however, a failure on this farm, as also generally in this section. While speaking of the orchard on this farm, we may add that, in the section of country in which we have been travelling, we found that

the apple crop this year is going to be an exceptionally light one ; the orchards are all, or nearly all, affected with a sort of blight. We made very careful inquiry from the most intelligent fruit growers we met with, to see if we could find out the cause, but were unsuccessful. It appears that in many orchards the blossom came out all right, and the fruit well set, but afterwards the greater part dropped off, and what is left on is very inferior fruit, and in most cases would be quite unfit for shipping. The leaves are also badly affected, and a large number of the trees have a dying look. None of those whom we met seemed able to explain the cause, various theories were advanced, but no one seemed able to speak authoritatively.

A fine belt of well grown forest trees around Mr. Linn's orchard acts as a wind break, and shows well.

Men like Mr. Linn do good in any neighbourhood ; for, while beautifying their own farms, they set an example which, in the course of time, is sure to be more or less followed by those living around them.

Mr. George Taylor's Farm, Township of Keppel.

After getting through with the last-mentioned farm, we went back to Owen Sound, reaching there about noon.

Taking fresh horses, we started on a thirty-mile drive. The road we travelled in going to Mr. Taylor's farm, although very rough, was for a greater part of the way a rather pleasant road to travel, skirting the bay for nine miles, until we came to a small place named Pesquile ; at this point we struck inland. Driving along for the first time through this township we could not, by any stretch of the imagination, make ourselves believe that we were going to see a model farm ; but as it was not a question of fine farms that we had to deal with, but farm management, we saw no reason why the gentleman's farm we were going to visit might not give as good evidence of first-rate farming as those farms more favourably situated. But this we did feel sure of; that is, that if his farm was of a nature similar to those we were passing, a great deal would require to be done before much could be seen for the work, and he would, of necessity, thus be placed at a great disadvantage.

This farm is situated fifteen miles from Owen Sound, in a pretty rough section of country. About one half is tough clay, most difficult stuff to work at any season ; a portion of the remainder big stones, with a little soil among them ; and somewhere about one-third of the whole 200 acres comparatively worthless rocky land, the rocks rising to a considerable height; and, as Mr. Taylor informed us, not even safe for sheep to run on, on account of the numerous fissures in the rock, causing it to be very liable for sheep to get their legs broken.

The improvements on this farm represent a large amount of very hard work. Mr. Taylor is evidently a hard working, industrious man, and he appears to have managed well, considering circumstances. All the improvements in the way of buildings, etc., as well as the price of the land, has been made of the farm.

Mr. Taylor is an intelligent Scotchman, and with his hard working and industrious habits is just the sort of man to make the most of such unfavourable surroundings ; but why he ever struck his tent where he has done will ever be a puzzle to us.

We thought to ourselves when looking over his farm, such a blessing it is that we have a great North-West with its boundless prairies for our surplus population, rather than that they would have to wear their lives out in an endless struggle in such an unproductive and inhospitable region as we saw in the Township of Keppel.

Bidding good-bye to Mr. Taylor, and with a feeling of satisfaction that this was the end of our work for the time being, we started on our way back to town. Next morning we left for Orangeville at 5.20 a.m., intending there to get breakfast, and make connection with the Credit Valley road ; but, as it turned out, we missed our breakfast and didn't make connections, for on reaching Markdale, we found two large grain warehouses on fire, close to the track. This caused a delay of two hours, thus losing our connection, and necessitating our going round by Toronto.

In conclusion, we would take this opportunity of sincerely thanking those gentle-

men whose farms we visited, as well as others, for the great kindness received and the courtesy extended towards us during the time we were among them. And however much they might differ in their style of farming, they were as one as far as regards kindness and hospitality and in their endeavour to make our work as agreeable as possible.

Before closing it may not be amiss to say that in inspecting the different farms and in drawing up our report we have kept prominently before us the importance of examining into and describing the best system of farming as carried on on the different farms, being well aware that if this farm competition is to result in any general good it must arise in two ways. The first in giving a stimulus and causing a spirit of emulation and inquiry in those sections where the competition is taking place; and, secondly, by observing and describing whatever we believe to be superior in the management of the respective competitors. This we have endeavoured to do as fully as the limited time at our disposal would admit of, and with due regard to not making our report so lengthy that it might defeat the very object aimed at.

We have the same remarks to make this year as your judges had last in reference to the great difficulty we had in some cases in coming to a decision satisfactory to ourselves. While wishing to give due prominence to well constructed homesteads, judicious planting, fine surroundings, and well bred and profitable stock, we had to remember that there were other very important elements entered into, and had to be considered with reference to successful farming.

With very few exceptions we found the farms entered for competition well managed, and such as the owners had no need to be ashamed of. We found also the system and style of farming throughout the different counties as a rule, and comparatively speaking, good; and, judging from our own observation, we believe the day is fast arriving when the Canadian farmer is going to occupy a higher position, and one more in keeping with the importance of the great interests he represents. This, however, can only be brought about by setting before ourselves a high standard, and aiming to arrive at it; we must not be content with our present status, but go on improving. In this direction much has been done of late years. The Ontario Government, through the instrumentality of its School of Agriculture, is doing great service by imparting that knowledge which is necessary to farm on correct principles; the intelligence of the farmers, with their superior opportunities of acquiring information, is doing more. But unquestionably the great end to be aimed at, so as to bring about the best results, is to get our young men (the farmers of the future) to take hold of farming not simply as a means of making money, but also to love the profession for its own sake as well; no very high standard will ever be arrived at until that is done.

To this end the farmer should endeavour, as well as taking a pride in his well tilled fields, to make his calling attractive to his children; something should be done to make home within and without pleasing and attractive. The old homestead should be made beautiful to look at. It requires not very much besides good taste and a little spare time to make it that one charmed spot to be remembered and looked back to with kindly feelings as long as life lasts—the well loved home never to be forgotten. Depend upon it, impressions for good or ill are formed from the surroundings. The rickety, tumble-down buildings, the bleak and barren birthplace will never arouse that love of home so necessary to inspire a wish to live the homely life of the farmer; but will tend much more likely to drive him from it and to other pursuits.

Perhaps some reader may ask what has this got to do with a farm report? We say, that we have had special opportunities of drawing contrasts; not only have we seen the cheerful looking and happy home, rendered so in a great measure by the good taste and the kindly consideration of the farmer for the happiness of those around him; but we have passed not a few farmers' homes with not a pleasing spot to relieve the bleak and barren look of all around, and if these men are left in the sere and yellow leaf of old age, like a tree shorn of its branches, without a helping hand on the old farm, or if their sons through the cheerless life have gone to other pursuits and failed, assuredly they have had much to do with it.

(Signed) JOHN I. HOBSON. } *Judges.*
J. P. BULL. }

FARMS ENTERED FOR COMPETITION IN GROUP 3.

Name.	Post-Office.	Township.	County.
Adam Esplin	Burgoyne	Arran	North Bruce.
William Esplin	"	"	" "
Robert McConkey	Arkwright	"	" "
Richard Rivers	Walkerton	Carrick	South Bruce.
James Tolton	"	Brant	" "
Andrew Waechter	"	"	" "
Robert Linn	Kilsyth	Derby	North Grey.
George Taylor	Oxenden	Keppel	" "
John Ford	Markdale	Artemesia	East Grey.
John Varcoe	Carlow	Colborne	West Huron.
John Salkeld	Goderich	Goderich	" "
Charles Blake	"	"	" "
James Dickson	Seaforth	Tuckersmith	South Huron.
George Hyde	Shakespeare	N. Easthope	North Perth.
Richard Bell	"	"	" "
James Crerar	"	"	" "
Duncan McLaren	Cromarty	Hibbert	South Perth.
Alexander McLaren	"	"	" "
John Hodgson	Staffa	"	" "
J. & R. McQueen	Salem	Pilkington	Centre Wellington.
Charles Nicklen	Ponsonby	"	" "
William Elgie	Barnet	Nichol	" "
Walter Sorby	Guelph	Puslinch	South Wellington.

ESSAY ON MANURES: THEIR PREPARATION, APPLICATION, AND EFFECT ON GROWING CROPS, AND IN MAINTAINING AND INCREASING THE FERTILITY OF THE SOIL TO WHICH THEY ARE APPLIED.

By John Smith, Jun., Ratho.

To which was awarded the First Prize by the Agricultural and Arts Association.

By Manures we understand those substances which furnish food for plants, and thus enrich the soil. When crops are continually removed, and nothing returned to the soil to replace the elements carried off, its fertility is speedily impaired, and in order to restore it we must return to it those elements it has been deprived of. We effect this most speedily by manure.

When we consider that every constituent of plants and animals is derived from the soil and the air by the action of light, warmth and moisture, and that the vital principle can assimilate but cannot generate a single element, it is evident that all vegetable and animal matter must be regarded in some respect or other as manure. During life, substances absorbed, but not required by their organisms, are disengaged in the form of excrements. After their death, their nitrogen and carbon pass into the air as ammonia and carbonic acid, and at last nothing remains but a small quantity of earthly matter. The atmospheric supply of carbon and nitrogen is thus being continually renewed by decaying organisms, and continually absorbed by living ones.

Having thus briefly stated how the great invisible storehouse of fertility is always supplied, and ready to yield its gaseous elements for the support of vegetation, the way is prepared for the consideration, in the first place, of Vegetable Manures, and the fallacy of the idea that nothing more is returned to the soil than what has been taken from it, by plowing under a green crop, will also be apparent.

When our Ontario farms were cleared of their dense forests they were covered with a superabundance of rich vegetable deposits, the accumulation of centuries of decaying vegetation. Such a seemingly inexhaustible supply rendered our settlers careless about returning much manure to the soil, in order to keep up or improve the fertility of their farms. The consequence has been that after fifteen or twenty consecutive grain crops, what was deemed the most productive land in the world began to show signs of exhaustion, and when this management was continued a few years longer, is it any wonder that grain growing ceased to be profitable? The vegetable mould—the humus of the agricultural chemist—seems all but exhausted, nor are mineral elements available in sufficient quantities. To remedy this, the elements of fertility must be restored or otherwise made available. It is evident that the home supply of barn-yard manure is inadequate to keep up, much less restore fertility, under such an exhaustive system of cropping, and when no extraneous supplies are available, recourse must be had to *green manures*, or crops of vegetation of some kind, which should be returned to the soil and allowed to decompose. By almost universal consent, clover is considered the best crop to plow under as a green manure. Its leaves absorb large supplies from the atmosphere, and its long top roots penetrate the subsoil and assimilate plant food that is beyond the reach of the grain crops. On soils too poor to grow clover, buckwheat has been advantageously used. Oats and peas, rye, corn, turnips—even Canadian thistles—may be also turned under with advantage. Seeding down to grass must also be resorted to to restore fertility to run-down farms. When it is difficult to secure a catch, grass seeds had better be sown in the fall, either alone or with fall wheat. Success is much more certain at this time. By laying in pasture three or four years it will be found to have regained its fertility to a considerable extent. We cannot suppose that in this time all the elements that say twenty consecutive grain crops have removed will be restored : but by absorbing carbon and ammonia, disintegrating mineral matters, decomposing or assimilating injurious excretions from a succession of grain crops—not to mention the wonderful amount of vegetable matter accumulated in the thick mass of fibrous roots and leaves, which, on a close sod, careful calculations place as high as forty tons to the acre—enough plant-food has again become available for several crops of a rotation. The fertility of soils may be kept up indefinitely without resorting to any other manures, by keeping a proper proportion of the arable land in grass. When the home supply of barn-yard manure is carefully attended to and applied, the fertility of the farm can be maintained by having about one-fifth of the arable land in pasture. On poor soils, of course, a larger area in pasturage would be requisite. Were barn-yard or other manure entirely dispensed with, probably as much as two-thirds of the arable area would require to be in grass. That the fertility of the soil may thus be kept up indefinitely there is any amount of evidence.

In the district surrounding Naples, in Italy, where the farmers live in village communities, and their outlying lands are often eighteen or twenty miles distant, the practice has prevailed from time immemorial of taking a crop of wheat every third year, and lightly pasturing the other two, and the fertility of their soil still remains unimpaired. But although pasture and green manures are valuable, in fact indispensible, in all places remote from centres of population, no intelligent farmer would think of relying entirely upon them for maintaining and restoring fertility. The barn-yard must still be looked to as the great magazine of manure supply. Notwithstanding the march of science, and the multiplication of artificial fertilizers, both science and experience still proclaim barn-yard dung the best and most perfect manure—the only one that contains all the elements of plant food, and alike suitable for all soils and all crops. It is, therefore, purposed in this paper to devote the greater share of space to discussing how to make the most of this universally available supply. There is an amusing and rather confounding diversity of opinion abroad, among both practical and scientific men, about the best methods of preparing and applying the products of the barn-yard. Some contend that it should be well rotted before being applied, and to accomplish this they, at great labour, turn it up into a large heap, so as to hasten decomposition, and destroy weed seeds ; others, that there is a great loss of fertilizing material as the only reward of this needless labour. Some think manure should always be kept under cover, so as to be capable of absorbing a greater quantity of liquid excrements, and be prevented from losing its soluble salts by the

repeated drenchings of rain or melting snows ; others, that it is better exposed, as the rains fix the volatile elements, and thus prevent a greater loss than the loss of soluble matters amounts to. They also consider it injurious to the health of animals to have a covered yard for manure adjoining the stables, as the gases evolved during fermentation are injurious to animal life, however beneficial to vegetation. In the preparation of manure all agree that the two great evils to be guarded against are too great exposure to leaching, or loss of soluble constituents, and too great loss of volatile matters caused by too rapid decomposition. We consider that, with proper management, the one evil can be as effectually guarded against as the other, by means of a covered yard, large enough to afford the young cattle kept on the farm comfortable winter quarters, as we will endeavour to show before we are done with this subject. But as the majority—as yet the vast majority, I might say—cannot have all things as we think they ought to be, we must do the best we can with things as they are. Let us, therefore, endeavour to reduce to a minimum losses that we cannot entirely prevent. Let us see to it that drippings from eaves, and all surface currents, are prevented from leaching the dung pile, and that as small a surface as possible is left exposed to the weather. Instead of spreading the manure all over the yard, let a compact pile be run up to the depth of four or five feet, and gradually extend it at this depth. If there should thus be more up-hill work, what would be lost in height would be saved in distance, not to speak of the advantage of loading from a high pile. It is better, where it can be conveniently done, to mix the dung from the horse and cow stables, and the sheep and hog pens ; but where this would involve much extra labour it is not advisible, as this labour would add to the cost, without adding with the same certainty to the value of the manure. During winter there is no danger of even horse dung fermenting too rapidly, and if the cattle have access to it, it will require no further attention till towards the end of April. After this, however, if the horse dung is piled by itself, it requires more attention to prevent it from wasting its substance "on the desert air." This too rapid decomposition, or fire fang, as we farmers call it, is very easily detected. The man who "nose" it not even from afar, must have a very bad cold in the head, or otherwise badly demoralized olfactories. But even he, if not blind, also, may see the vapours ascending in the cool of the morning from the spots where this species of "dry rot" is going on, and if he is a wise man will promptly stop it. This is most effectually done by wetting it, and if some of the mud and slush convenient—there is generally plenty in April—is shovelled on top, no further trouble need be anticipated. With the utmost care, however, there will always be a considerable loss in an exposed yard, of the soluble substance of the manure. On the farm where the writer was "raised," in Scotland, all the leachings from the dung steads, and liquid from the stables, were drained into large tanks, and from these it could be distributed through underground pipes, wherever it was thought beneficial, by means of force pumps, operated by steam. It was principally applied to grass, and sometimes to young turnips, but never, that I can recollect of, to growing grain. There could be no disputing its beneficial effects, as three heavy cuttings of Italian rye-grass, used for soiling purposes, could be obtained in a single season. Neither could there be any dispute concerning the heavy expenditure necessary for such a method of utilizing the liquid manure. Whether the extraordinary results recouped the extraordinary expenditure I am rather inclined to doubt, as some very advanced and much talked of farmers who adopted this system became hopelessly bankrupt. When we consider that in the liquid excrements of cattle there is about ninety-five per cent. of water, that enough water is generally supplied to the soil free of cost, we are led to conclude that the best way to utilize the liquid manure would be by filtering it through absorbents that would retain its fertilizing properties, and allow the water to drain off. This could be accomplished by having the drainage from the stables and dung hill to filter through the compost heap ; or failing this, the next best way is simply to let it irrigate as great a surface as possible before it reaches the nearest ditch. The soil possesses the property of absorbing and retaining the soluble constituents of manure in a remarkable degree, and to such an extent that several years would be required to render a compost heap so rich that it would be incapable of further absorbtion and retention. But not a few of our intelligent Ontario farmers have already solved the problem of profitably utilizing the liquid manure in a way already indicated—that is, by making their manure under cover. It

has long been a well known fact that the very best of manure is that from loose boxes, and they have, therefore, adopted the sensible plan of making all their manure on the big loose-box principle. By this method the liquid excrements are absorbed and retained by the litter and solids. From personal observation the writer is satisfied that all, except what may be lost by evaporation, is thus absorbed. During last winter he had four calves kept in a loose box 10 by 12 feet. Some four or five inches of musty chaff covered the ground when they were turned in. Although they were only sparingly littered, no smell was appreciable, except during the removal of part of the contents, which happened twice during the winter, and the offensive smell was retained on again strewing with fresh litter. In spring the pen was entirely cleaned out, and, contrary to expectation, the chaff at the bottom was about as dry as when the calves were turned in. This shows that the litter and solid excrements are capable of absorbing and retaining all the liquid excrements, provided extraneous moisture is excluded, as is the case in a covered yard. This yard is used as winter quarters for young cattle; the labour of cleaning out their stables is thus avoided, and with a fair supply of litter they are in every way clean and comfortable, and seem to thrive better than when tied up in stalls. By trampling and consolidating the manure—that from the stall-fed animals as well as their own—the too rapid decomposition that often takes place in warm manure cellars is entirely prevented. Observation and scientific research alike concur concerning the properties of fibrous material—in ordinary manure, if present in sufficient quantity, of preventing the escape of volatile constituents. Professor Voelcker, one of the most eminent English authorities on this subject, says that while the animal portions, liquid and solid, ferment and putrefy, the straw and fibre by such action resolve themselves into fixers of ammonia so evolved, and retain it in the shape of a soluble compound exactly fitted for plant food.

If the volatile elements can be thus retained by a sufficient incorporation of straw or fibrous material used for litter, it will be seen that the objection to keeping manure under cover, especially in connection with stables, is disposed of. The benefits of this method of preparing our barn-yard manure may be thus concisely stated:—It is of greater value; and it can be more economically handled on account of its freedom from superfluous water, and also from the fact that it can be handled at any time—in winter, for instance—when it would generally be found impossible to handle exposed manure. Regarding its value, when it is considered that the liquid excrements, the richest in nitrogenous matter, are all incorporated by this method, there can be little room to doubt. But if there is any doubt, it is not with those who have adopted this plan. The friends and acquaintances of the writer, at any rate, when interviewed on this subject, all agreed in stating that, since they adopted the covered yards, they considered their manure of much greater value. As none of them, however, had carefully experimented with manure made under cover, and in the usual way, it may not be amiss to refer to careful experiments made by Lord Kinnaird, a Scotch nobleman, in this direction. On equal parts of the same field, from equal quantities of manure made in the common way, and in a covered yard, trodden down by cattle, the results were:—

Covered,	$11\frac{3}{4}$	tons.....	Uncovered,	$7\frac{1}{2}$	tons potatoes.
"	54	bushels.....	"	42	bu. wheat.
"	215	stones straw	"	156	stones straw.

Another point remaining to be discussed is the degree of decomposition that should take place, or the thorough rotting of the manure before it leaves the yard. With regard to this there is a great diversity of opinion among practical farmers. Experience goes to prove that in all cases where fine "tilth" is required, as with crops grown from small seeds, such as turnips, and garden vegetables generally, the direct application of green, unrotted manure is prejudicial, while thoroughly rotted may be directly applied with decided advantage. Experience also goes to prove that well rotted manure acts more directly, and is more readily assimilated as plant food; and thus a great many cling to the notion that the quality of the manure is improved by being thoroughly rotted, and to accomplish this they turn and pile it in a large loose heap, at a very great expenditure of labour, and a very great loss of valuable gaseous elements, as the operation is generally conducted, by the too rapid fermentation of the mass. That the greatest good in the

shortest time is the result of this treatment we are willing to admit; but the greatest good for the longest time is a more desirable result, and this can be best accomplished by applying the manure in a much less decomposed state, and before it loses much of its fertilizing properties. I have been of those who practiced turning the manure, in order to have it more thoroughly rotted before applying, as well as to destroy weed seeds, but I have now abandoned the practice, as I have always been sure of the extra cost, but have not been so certain of extra results. Perhaps the best crop of turnips I have yet raised were manured in the drill, with dung thoroughly rotted by turning, and applied soaking wet with liquid manure, and covered immediately. They seemed to grow right along, although it was rather a dry season. Off an acre thus treated we had thirty large waggon loads, and that in a season when turnips were much under an average crop. But in ordinary seasons I obtain about as good results by manuring the land intended for roots the fall previous. The cost of turning and the extra labour of spreading in drills are thus avoided, and the manure gets thoroughly incorporated with the soil before the time for sowing arrives; thus the evil effects of applying fresh dung are completely avoided, and the full benefit of the manure is obtained. When the loss in quantity is not compensated for by gain in quality—and it is contrary to science, reason or common sense to suppose so—then why should the antiquated practice of turning the dung pile be still indulged in? In a few weeks it will thus be reduced in bulk 40 or 50 per cent., as every one is aware. Of course we still have the *bones*, but the winds have made off with a great part of the *carcass*.

Having now discussed the preparation of barn-yard manure, how best to apply it will be next in order. It was formerly the received opinion that the sun and air would extract the strength of the manure, and thus the practice of leaving it exposed any length of time to their action was deprecated, and all good farmers had it plowed under as quickly as possible after being hauled on the land. This, on small farms, necessitated too frequent changing from one job to another; but apart from this, there could be no loss from the practice. Practical and scientific men are now pretty well agreed that when manure is once spread on the surface of the soil, it may be left indefinately, without losing its fertilizing properties. If it dried, only the water would evaporate, and if it rained, the solution would be deposited in the soil just where it was wanted. Whether the manure should be applied to the surface or plowed under, depends on the nature of the soil and the crop. Generally speaking, it will be better to have it incorporated with the soil. All soils, that are not naturally sufficiently open or porous, are thus benefited in two ways. By its mechanical action they are kept more loose and mellow, the air is thus allowed freer circulation, and moisture and volatile matter are absorbed more freely than by a hard baked soil; and its fertilizing properties are placed where they can be directly acted upon by the roots of plants. On very porous soils it is generally recommended to keep the manure as much on the surface as possible, as there is greater danger of soluble constituents being carried into the subsoil, beyond the reach of plants. We think, however, there are but few soils in which there would be much loss in this way, as an All-wise Providence has conferred on all but barren sands, the property of absorbing and retaining the elements of fertility, and allowing only pure water to pass off. The very richest soils are thus incapable of being impoverished in the least by any amount of drenching. Perhaps by acting as mulch, in shading and retaining moisture in the soil, the beneficial effects of top-dressing light soils result.

How to get the manure applied to the soil most economically, however, is the most important question. If it is once there its beneficial effects are certain sooner or later; but there is the proper time and way for doing every thing. As far as my experience goes on the farm I cultivate—a clay loam—I find the fall the best time for applying manure for all crops, except, perhaps, potatoes. With these I think I have succeeded best by manuring in the drill with horse-dung, just before planting. I also find that with our climatic conditions, and under the ordinary circumstances, the manure can be most economically distributed in the fall. Immediately after the winter wheat is sown there is as much leisure as any time, and the land is generally firm—frequently difficult to plow—and this is just the condition for hauling big loads easily. By plowing it under as soon as possible, seeds will germinate, and decomposition, to a certain extent, proceed

before winter sets in. Spring cultivation will incorporate it still further, and the land thus treated will be in proper condition for any crop.

Having now devoted considerable space to barn-yard manure, we must now turn, briefly, to some more neglected sources of manure supply than the barn-yard. Of these the best, and worst economised, are the excrements of the genus *homo*. Perhaps the instinct, common to the lower orders, of avoiding their own excrements, may be stronger with us than the Chinese. It can hardly be supposed that ignorance of their value is the cause of their neglect—it must, therefore, be inferred that repugnance to the handling has something to do with the waste of this valuable fertilizer. To overcome this, we should keep a barrel or box of dry earth in our water-closets, and do with it as the Israelites of old were commanded—"Cover up that which cometh from you"—there would no longer be cause for turning up our noses at the offensive "perfumery" so generally encountered on entering, or even passing at a respectful distance, those necessary adjuncts to our dwellings. By being mixed with earth an inodorous compound results that can be handled as pleasantly as garden mould, while it is much richer in nitrogenous matters than the poudrette which is manufactured from the night soil of many large towns, as the treatment with lime and ashes to which it is subjected, renders the product inodorous by the expulsion of ammonia, while the mixing with earth absorbs and retains it in a soluble condition. It has been estimated that the excrements of man, liquid and solid, would, in a year, amount to between 500 and 600 lbs. This, if composted with about four times its bulk of muck, would contain more than sufficient fertilizing material to apply to an acre to produce the richest possible crop every year. Every farm might thus economize a considerable supply of manure, which, besides being richest in nitrogenous material, would also be richest in phosphates. We know that the Chinese, by carefully collecting and applying their own excrements, can almost entirely dispense with other manure, and still maintain such a state of fertility as to support a much denser population than any other country on the face of the earth.

The limited, but highly concentrated supply from droppings from the poultry would also well repay a more careful collection and application. As this is too strong for direct application, it should be composted with about three times its bulk of earth, to which Plaster of Paris may be added, but not lime or ashes, for reasons already stated.

Another valuable source of fertilizing material, not much attended to here yet, is the "compost" heap. This should be a sort of "*omnium-gatherum*," into which all manner of waste substances, vegetable or animal, capable of rotting, should be collected, and mixed with muck or loam. Considerations of health, as well as economy, should induce us to scrape up all decaying matter, and incorporate it with the compost heap. From a dead hen to a dead horse, the compost heap is the best place to put them. As much as twenty tons of compost, at least equal in value to barn-yard dung, has been obtained from the decomposition of a horse. We believe the labour involved in collecting and distributing compost is the reason why this is so little attended to. It is a downright necessity to get rid of the barn-yard dung some way, but we can jog on without bothering about compost. Perhaps in not a few cases it may be questionable whether the same expenditure of labour, devoted to the extra cultivation of the soil, would yield more profit. But if the compost heap were allowed to do duty for several years in the manner already indicated, as an absorbent, the labour would be reduced to a minimum, and the value of the product much enhanced. The space at our disposal will not permit further consideration of this subject, without dismissing other valuable manures with no more than a passing notice.

Bones have long been regarded as a very valuable fertilizer, and as a consequence, the prepared product, whether ground-bone or superphosphate, has a high market value; so high that it is still questionable whether their employment, at current rates—not to mention the doubtful quality—would be profitable with us. But as there is no question of their good effects, all that can be had for the picking up may be profitably employed. They may be prepared for application by burning and otherwise. Piled up with wood they burn easily, and it is said that as much wood as could be wheeled on a barrow will burn a ton of raw bones, leaving a mixed white and coaly mass, which is very readily broken up. Of course their organic constituents are thus driven off; but about 66 per cent of valuable mineral matter remains. By a little more trouble they may be prepared

by rotting, thus :—After roughly breaking with a sledge, put them in a hole in the ground, and mix with an equal quantity of good wood ashes (unleached); cover with earth and pour soap suds over them occasionally. In two or three months a decomposed, soapy-looking mass will remain, which may be mixed with earth, and thus applied with benefit to all crops.

Wood ashes are also a valuable manure, and quantities are available on every farm with us. They are considered most valuable for roots and grasses, and may be applied in quantities of ten to twenty bushels per acre, the greater quantities on heavy lands. Like all manures abounding in lime, repeated dressings, without a corresponding addition of vegetable matter, will eventually exhaust land.

Gypsum is used both in the United States and Canada more extensively than any other artificial manure, and is by many considered indispensable to good farming. Like all manures abounding in lime, gypsum acts beneficially on all dry soils abounding in vegetable matter, and is generally applied at the rate of two to four bushels per acre. It is found beneficial principally for increasing the stem and foliage of plants, and is therefore principally applied to grasses and clover, by being sown broadcast as soon as the leaves have expanded in the spring. It has but little effect when incorporated with the soil, and its effects vary much on different soils and on different seasons. Generally speaking, it has least effect in dry seasons, and on light soils. Gypsum also, from its valuable property of fixing ammonia, is very valuable for sprinkling on dung heaps, and in stables, and will add considerably to the value of manure on which it is thus employed. The best results are obtained from plaster, by sowing it when it will adhere to the leaves, as in the mornings and evenings, when they are damp with dew. If it should be washed off by a shower immediately after application, its beneficial effects are hardly discernible.

In Britain, next to farm-yard dung, lime is in most general use as a fertilizer. It is applied to the land after burning at the rate of from 100 to 300 bushels per acre—the heavier quantities on stiff clays. The lime, when hauled from the kilns, should be laid down in small heaps in the field and covered with earth, then slacked, and applied in as powdery a state as possible. Lime seems to possess the property of giving adhesiveness to light lands, and comparative openness and porosity to stiff clays. Experience has shown it to be useless on wet and swampy lands, and it is only on thoroughly dry land that its application is permanently beneficial. Its action is generally thought to depend on its powers of decomposing and rendering assimilable the elements of fertility already in the soil, and the best results are obtained from its use in conjunction with manure, as experience has shown that

> "Frequent lime without manure,
> Makes both the farm and farmer poor."

Lime has also been found useful in eradicating couch grass and other injurious weeds. As the soil of the greater part of Ontario abounds in calcareous matter, its use will not likely be so beneficial as on soils deficient in this constituent. As far as I am aware, sulphate of lime or gypsum, is the only form of lime that is found generally advantageous amongst us. The cost of quick-lime at the kilns, which are few and far between, is about 20 cents per bushel, and when to this is added the cost of hauling, slacking and spreading, the application of the minimum quantity of 100 bushels per acre, would cost half the price of our best farming lands! or an expenditure still out of all proportion to the price of land or the results obtainable. For the same reason other high-priced fertilizers, such as superphosphate of lime, bones, nitrate of soda, guano, &c., cannot as yet be profitably employed by the general farmer. In quantities necessary for composting with muck, however, lime may be profitably used. In experiments with lime composts at Ontario's Experimental Farm, the results were better than obtainable from farm-yard manure.

Space now compels me to close this paper, with a very brief reference to salt as a fertilizer. Its use amongst us has been rapidly growing of late, so it must be thought to be beneficial by many. In the evidence before the Agricultural Commission, a great diversity of results was reported. Some thought it had increased the yield 50 per cent.; others observed scarcely any benefit from its use. Dr. Dawes, of England, after experimenting sixteen years, concluded its use was unprofitable; Prof. Voelcker thought it was

beneficial by retarding maturity, and thus enabling the grain to develop better ! Where practical farmers and eminent scientists differ so, let every one judge for himself. This is what I am trying to do, but I have not yet been able to decide whether the *pros* or *cons* should have it.

ESSAY ON MANURES: THEIR PREPARATION, APPLICATION, AND EFFECTS ON THE GROWING CROPS.

By M. McQuade, Egmondville.

To which was awarded the Second Prize by the Agricultural and Arts Association.

A manure is any substance which enters into the composition of a growing plant, and is generally divided into two classes according to their mode of production, and are called natural, or artificial manure. To the first class belong those forms of plant food which are furnished through natural agencies by the decomposition, digestion, or combustion of vegetable matter, while artificial manures, as their name implies, are produced by artificial means, or are found already formed in the earth. We shall take these in the order in which they rank in importance, and are here given, and, as this will be read by and useful only to farmers who are not generally acquainted with chemical terms, we shall avoid all scientific language and technical terms except such as are easily understood.

NATURAL MANURES.

This kind is, by nature, subdivided into three divisions, which are characterized by their mode of production, whether by decomposition, digestion, or combustion of vegetable matter, by which it passes into its elements. It may be well just here to tell what an element is, as this distinction is absolutely necessary to be known before the true action of manures can be explained. An element is a simple substance from which nothing different from itself can be obtained. A universal characteristic of elements is that they always unite with each other in extremely small quantities. This may be illustrated by any of our ordinary every day operations, which we shall try to explain ; as a lesson thoroughly understood is worth two half learned. The great bulk of vegetable elements exists as gases, or thin airs, which, by combining in fixed proportions with each other and with minerals, compose not only all parts of vegetables but the tissues of animals and all their products. We place a few pieces of wood or coal in the stove, touch it with a lighted match, a fire is kindled, air rushes to the flame, and oxygen gas, one part of air, unites with the burning wood, an element of which unites with a particle of this gas and flies off in smoke to form food for plants. So long as a particle of wood remains this union will go on, an element of wood uniting with an atom of oxygen. If these elements did not unite in this manner, but in large quantities, our fuel would explode like gunpowder, not only not giving out gradual heat, but doing much damage. On this beautiful law, the gradual decomposition of compounds into their elements, and the recomposition of those same elements into vegetable structures, the formation of manure and its action on growing crops depends.

ELEMENTS OF MANURE.

In order to make the modes of handling and applying manures intelligible, we shall give its leading elements a passing glance. The bulky part of natural manures, from which crops are formed, is charcoal, or black mould, oxygen gas, which forms an element in water as well as a portion of our atmosphere, nitrogen gas, another portion of our air, hydrogen gas, the other element of water, chlorine gas, an element in common salt. These, united in definite proportions to lime, potash, soda, phosphorous,

sulphur, iron, flint, manganese, and magnesia, go to form a complete manure, which contains all the elements necessary to produce a full crop. These elements being found in plants, and being necessary to the growth of plants, it follows that manure which has been formed by the decomposition, or proper rotting of the entire plants, is preferable to all others, which brings us face to face with properly made barn-yard manure, which must be admitted in practice, as it is in theory, to be the true type of the only article that answers the purpose.

BARN-YARD MANURE.

This article will be perfect or imperfect in proportion to the amount of the elements which formed the crop that have been retained in it and returned to the soil; also to the kind of crop which has been used for fodder during the time of its production. Manure from ripe straw is not so rich as from that which was cut green; manure from timothy is not so rich as from clover hay. Ripe straw, with rations of roots or grain, will yield a richer article than when straw only is fed, and for very good reasons; first, because ripe straw has given up most of its properties, both as a fodder and manure, by the grain which it yielded; next, straw cut green, and at the proper season, contains in itself a larger quantity of those substances which would have formed the grain, and is, therefore, preferable for fodder, which adds more sustenance to cattle and yields a richer offal. The value of the manure will always depend on the kind of food used, the age and condition of the animal, and the purposes which it is serving. Manure yielded by full-grown fattening cattle, when grain and oily provender are fed, is to be ranked at the head of the list, that from young animals should be placed next, while that from milch cows and working cattle must come to the foot of the list. The reason of this is obvious. In full-grown cattle there is little demand for the mineral part of food, which is thrown off in greater quantity in excrements. Young growing animals, on the other hand, demand more mineral to build up the bony structure, and these will be in less quantity in the manure; cows and nursing animals have a large demand on all the elements of food, and are, on that account, not producers of first-class manure, while the wear of work on animals that labor causes a large portion of the food elements to be given off in the wear of nerve and muscle, and in the sustaining of heat. In valuing manure these items must be constantly kept in view, as the treatment which it will bear and demand must depend very much on the richness of the manure under treatment. These considerations determine the difference between rich and poor, hot and cold manures. The richer the mass the more care will be needed in its treatment, and the greater will be the loss by careless or bad handling, the more rapidly will volatile compounds be formed, which, if allowed to fly away, will be ruinous to the farm.

Proper plan of treatment.—There is no single article on the farm which is treated in a greater variety of ways than yard manure. Some prefer to follow a method because it is the fashion, others because their fathers did it; while some, as yet few in number, have courage enough to think and act for themselves, study and read, experiment and decide for themselves, and nature generally rewards them abundantly for their courage and labour. If farmers were educated to their true standard, the laws which govern the true management of manure could be here plainly set forth, which would reveal a series of chemical changes more complex and beautiful than can be found in any other laboratory. We must always bear in mind that before any substance can become part of a plant it must be reduced to its simple elements, in other words, yard manure must pass through a course of fermentations, in the same way as sugar is changed to alcohol, vinegar, and lastly into putrid or rotten matter, when it becomes once more manure. Those same changes take place before any article of fodder can become manure in the strict sense of the word. While fermentation is in progress large volumes of gas are liberated, which, if allowed to escape, will leave the manure heap and farmer poor. These gases are parts of the manure and are the elements of plant food, of which we spoke at the beginning of this article, and, if we are determined to retain all the value, these gases must be held in the body of the pile. This is the difficult part of the operation, and the only one which requires both skill and labor. As was said, all plants must pass through three fermenta-

tions before they will become disorganized, or reduced to their simplest parts, before these elements are in a state to once more enter the circulation of the living plant. The essential conditions for fermentation are heat, air, and moisture, with a little leaven, the very same as is needed in the making of bread, beer, wine, and vinegar. The process is in both cases exactly similar, with this difference, that in the making of wines and alcohol about five-sixths of the food which was in the sugar of the grape or grain is allowed to fly off in gas. The malster and distiller trys to hasten this waste of food material, while the duty of the farmer is not to allow a single particle of it to leave his farm. This manure heap should always remain as inodorous as so much saw-dust, which is generally, though not always, the sign that he is not losing. There may be considerable loss after the sour fermentation has passed, without any smell, as the gas that then passes off will not offend the nose, though it is extremely valuable food for plants. It is colourless, tasteless, and once and a half as heavy as air, and, though of this density, it is very rapidly licked up by hungry air, and carried off much in the same way as a sponge takes up water. Water has the power of holding all the gases that are formed; of this heavy one it will hold one volume, that is one cubic inch of water will take in and hold one solid inch of this gas; while of ammonia, which every one knows, as it smells as does what druggists sell under the name of spirits of hartshorn, and which everyone can distinguish in his stables on a warm morning, which is of the utmost value as manure, of this very volatile pungent gas, one volume of water will take and hold eleven hundred volumes. These facts clearly prove the absolute necessity of keeping manure wet, all the time that it is over ground. Some farmers have got the idea that, the hot fermentations once past, manure will not lose by exposure, that cold, well-rotted manure is comparatively safe, that the heating process past, no smell being given off, no waste will take place. This a great mistake, for it is at this stage that the heavy inodorous gas mostly gets away, if the manure is allowed to get dry; it is in this state liable to lose very heavily by leaching, because all the elements are now held very feebly together; they are, in fact, in a state of dissolution ready to yield to every accident, and should be placed in the soil or kept covered with a coating of moist earth, and put so that no drainage can take place. The deductions to be drawn from this chain of facts are that manure should never be allowed to get warm without being kept wet and covered with clay, muck, sand, or some other body capable of holding the gases. These are facts sustained by the unerring and inflexible laws of nature, which agricultural science clearly proves, and which the intelligent practical farmer will always regard.

Turning and heating.—The practice of turning yard manure in summer and allowing it to heat rapidly in the open air is very bad, as vast volumes of the most valuable fertilizers are driven off to the winds, and are lost to that farm. The only way in which heating in allowable is in a method already stated, which implies much labour and care. In my essay on the restoration of fertility to partially worn out land, to which was awarded the first prize last year, a method of fermenting barn-yard manure was given, which for true economy does not seem to be easily excelled, and, though very much used in Ireland, does not appear to be unworkable in Canada; the main features of this plan are as follows: In a convenient place, so situated that surface water will run off, a cellar about five feet deep is made and large enough to contain twice as much as the bulk of all the manure which may be made during the season. Where the subsoil is clay, nothing more than the space is needed, but where there is much sand or gravel in the land, it must be floored and walled with some water tight material. Close beside this a cistern is placed, so deep that the surface of the liquid in the cistern may always be below the level of the bottom of the cellar. Into the tank the urine from the stables and byres is conducted by piping, laid beneath the ground so as to be below the influence of frost. This tank must be closely and securely covered, and supplied with a pump furnished with a few yards of hose with a sprinkler similar to a watering-pot. The only additional fixture needed is a piece of gas-pipe from the bottom of the cellar into the cistern. The next requisite is a few loads of dry swamp muck, clay, leached ashes, or fine sand, which must be kept under roof so as to be always dry and powdery. We have now the apparatus complete and ready for use; when a layer of rough manure, litter, weeds, fine brush, and generally all vegetable rubbish to be found about the yard and fences, is wheeled into the

cellar to the depth of two feet, or thereabout, trampled down, covered evenly with your dry muck, clay, &c., to about three inches deep, and the whole surface of the pile evenly wet with the liquid from the tank, allowed to stand for sufficient time to allow heat to get well developed, then fill in the same as before until the end of the season, or so long as there is material to use. When the cellar has been filled, covered so that no steam may be able to escape, and allowed to stand for a few weeks or months, according to the weather, until the last layer has been completely rotted. In Western Europe, where the climate is moist and temperature equable, the manure is wheeled from the stables and placed at once in position, but, with our severe frosts, unless much horse manure is on hand to mix in to start the heat, it is doubtful whether the plan would succeed in Ontario, unless started early in autumn, before cold weather sets in. But, for those who insist on turning and heating manure, this plan can be adopted with great profit after the spring work has been finished, when it will be in excellent order to apply to the land after harvest. When summer filling has been decided on, it will be necessary to keep the green manure flat, solid, and wet during the winter and spring, so that heating may not set in. This can be easily done with all but that from the horse stables, which will need to be kept quite solid and wet, and, for this purpose, will be better and more easily kept if the eave-drop be allowed to fall on it, if not heat will start and fire-fanging spoil the heap. If the horse manure be kept in this state, and so that cattle can trample over it, there will be no danger of loss.* Another precaution, which farmers should heed, is to always keep a box or old barrel of plaster of Paris (land plaster) in the stable, and dust a handful through the stable at least once a day, to take down and fix any gases that may escape. The plaster may be used either by throwing a few handfuls in a pail of water and sprinkling with a handful of straw, or by taking it in the dry state and throwing it high and wide so as to give a light dusting all over, when all escaping gases will be taken down and effectually fixed. This last plan is the most convenient which I have used with entire success, and, when properly and persistently used, will do much to add to the wear of harness, the prevention of throat and lung disease in horses, and add rich matter to the farmer's bread and butter. When the cellar system will be used, any refuse animal matter—old bones and the like—will be digested beautifully, with the precaution that old bones will need to be covered for a time with a mixture of quicklime and unleached ashes, and kept wet until they become somewhat soft, when the mass should be covered up in the manure cellar. Leached ashes will make a very good covering where swamp-muck and clay cannot be got. Where, by the hurry of work, want of labour, or any preventing cause, this system cannot be adopted, the next better plan is to use the manure fresh for root crops, in the first spring, and either cover it in the drills or plow it down fresh and keep it below the surface, where fermentation will take place in the soil and will show its presence for many years to come.

Solids and liquids together.—It must not be forgotton that the liquid manure must never be allowed to go to waste, and should either be used separately or mixed with the solid. In speaking of the cellar plan, provision has been made for this, but where that is impracticable the urine should be used to saturate the manure and litter, and so kept until safely in the soil. A plan adopted in some parts of Europe is to collect the urine in a tank and then, by means of a watering-cart, sprinkle it over grass land. When used this way care must be taken not to use it too fresh else it will injure the grass, and when allowed to be so old that an offensive smell is given off, much of its valuable properties will be lost; all things considered, the mixed form is better. The liquid manure from one cow during a year is calculated to manure one acre and a quarter, and in Flanders is valued at $10. In agricultural value, weight for weight, the liquid is to the solid, in round numbers, as seven to six; yet how many make any effort to save the liquid, which is richer than the dry part, and much more easily handled and managed. In considering the value of this neglected fertilizer, one is surprised that a determined effort is not made to save it, and let the other part take care of itself.

* When heating in cellar will be practiced in summer, no more time need be employed, nor quite so much as is needed in ordinary turning, as the heating will be rapid, and the air needed will be supplied by and in the body of the heating mass, and the depth applied at one time may be very much greater than when done in winter.

Effects of yard manure.—As we have here given two methods of preparing barn-yard manure, it will follow that the immediate effect of each of those kinds will be somewhat different, and will be each more or less adapted to particular and different soils, crops, and circumstances. Where the liquid manure is used separately the best effect will be obtained on grass land or green crops, because its principles are very fine and in solution, and are on that account liable to be washed too low, if used on idle land with a loose sub-soil; while, on the same soil, covered with a growing crop and with the soil full of growing roots, its digestible parts will be immediately seized by the roots, and any escaping gas taken in by the leaves. This objection applies to sandy or gravelly soils only. Clay land has a very firm grasp and will not allow much fertility to escape either up or down, though, even on it, the application is much better on the green sward, and is sure to yield more certain results in the right direction.

Fermented solid manure, when managed after the proper plan is eminently calculated to give the most decided, immediate, good results, and, when used on well-drained, heavy land and turned lightly down, is just what is required, and would suit a tenant with a short lease, but with a ten-year term, or the farmer runs the place in his own interest, and the land had not been allowed to run down, we would prefer the whole manure turned in green and fresh, for two reasons; first, because, though it would not yield its whole body in the first or second year, there would be no danger of loss by leaching or evaporation, while such a dose could be safely given as would satisfy the land for almost a decade; second, because the chemical action induced in the land, would assist in unlocking some of the mineral elements, which are held in stubborn combinations in all soils, and which are essential to the growth of a full crop of grain, or roots particularly; third, because when coarse manure is turned in green in heavy land, it has the effect of making it more porous, which will give better circulation of air through it. On light land, if it has not become too poor to yield a full crop, green manure will remain longer safely, and assist in dissolving the flinty portions of the soil, which will yield more abundant mineral elements to the needs of the crop, while the gradual fermentation assists in keeping up a supply of moisture. Thoroughly made manure can very properly be applied to grass land on the surface, for heavy land, as the winter is setting in, and, for light land, as the snow is going off in spring, and either cut a crop of hay, or turn under soon after the growth sets in rapidly; when the young vegetation, assisted by the manure, will set up such a chemical action as will have a most excellent effect in liberating plant food and dissolving mineral compounds.

There is no doubt but that some very respectable farmers will dissent from much that is here advanced; but, if we were permitted to brace it up with the authority, and if the farmers of Ontario were used to scientific argument and technical terms, we could make it as clear as that two and two make four. To go to the bottom of the subject of barn-yard manure would require not an essay but a volume, and, as there is a long list of others to come in yet, we must close this article with the general hints already given and take up

ARTIFICIAL MANURES.

This class is composed of more mineral and less vegetable matter, and, with perhaps one exception, is not composed of animal excrements. This exception is guano, and its first cousin, the droppings of barn-yard fowls, which approach each other in manurial value of a highly concentrated and valuable form; in fact, so strong are they that no vegetable can live under their undiluted influence, in large quantities. The home-made article deserves our special care, and should either be incorporated with coarse manure, or carefully preserved in a dry place mixed with road dust, dry powdered charcoal, or some other portable absorbent, and applied in small quantities in the hill or row, away from the sunlight and not in contact with seed or roots.

Guano, though a very valuable manure—with our fertile soil, low prices, and long carriage to Liverpool—must, to the general farmer, remain only a term of the books and periodicals which treat of amateur farming, and may form an additional paragraph in an essay on manures in the twenty-fifth century, when the plains of our North-West shall

have been all broken up and partially exhausted, and London and Liverpool shall have gone into decay, and Toronto and Montreal will have become the commercial centres of civilization. In those days it may pay the farmers of Huron to buy and use guano, but not till then.

1. *Lime compounds.*—This class of fertilizers naturally divides itself into two classes, according to the base or foundation on which it is formed. One kind has lime for its mineral base, and the other has either potash or soda united to one or more gases.

2. *The lime fertilizers* are phosphates which form the hard part of bones, and are found in the Province of Quebec in quarries, and a richer variety, made from digested bones; plaster of paris, which is also found in an excellently pure state along the Grand River, near Cayuga, these, with our common lime-stone, are all valuable fertilizers and rank in value in the order in which they are given.

The alkali fertilizers are South American saltpetre, with a soda foundation; common salt, also based on soda; North American saltpetre, based on potash; unleached and leached ashes, on potash also.

3. *Phosphate of lime*, like all this class of substances, is only a special article, which supplies a mineral which composes the hard part of bones, and is found in all grains and straws, in a greater or less quantity, and has, through its acid part, a specific action on the complex part of soil, by which some complex forms of combined elements are liberated and made available to the growing crop. The mineral phosphates act much slower than that made from bones. The application of this lime compound has the power of generating a series of chemical actions, which science alone can satisfactorily explain, which should be beneficial for all crops for many years. Where phosphates have been used plaster of paris will be produced, and this or the phosphates is much better adapted to soils in which much free lime does not exist.

Plaster of Paris, the next lime fertilizer, is made of oil of vitriol and lime. This article is also a special fertilizer and forms part of all crops, as such, it is a manure, but its action, like phosphates, is to act chemically to furnish lime to the crop and to keep up chemical action. This is a beneficial application to all land deficient in lime and sulphur. We may specify its particular mode of action. It will be remembered that it is made of oil of vitriol and lime, that when applied to sandy land a portion of lime is taken to form an ingredient in the plant, the vitriol, being liberated, takes ammonia from the air and holds it till the plant takes it up, when the vitriol, once more liberated in the soil, if any lime happens to remain in the form of chalk or limestone, the vitriol once more enters into union with the lime, and again forms another portion of plaster of paris to undergo the same set of changes over and over again, until the plaster has been all used up by the crop. Plaster is a special application to sandy soil, but on land that has both lime and sulphur, as is found in the south and eastern parts of Huron, plaster will have no good result on the land, as it already contains the elements of plaster in sufficient abundance for all practical purposes. On the lighter parts, towards the shore, it might be used with advantage.

Limestone and marl on very heavy clay, void of lime: on sandy soils this form of lime is a special fertilizer by the presence of its lime and also by the beneficial action of the gas which is united with it. All lime applications have a decidedly good action on the growth of grasses.

Soda and potash fertilizers, like the lime ones, not only furnish a part of themselves entire to almost every form of crop; as such they are truly fertilizers, but they fulfil a double use by acting on other compounds in the land. The soda and potash act very beneficially by their presence, the first principally on the growth of grass and straw, the second on the formation of starch in the growth of grains and starch-bearing roots. Both potash and soda have the power to assist in rendering crude vegetable fibre soluble, and are, therefore, specially applicable to soil that contains much black mould in a half-rotted state, for this reason saltpetre is well calculated to give a large yield of grass or hay on old and dry bottom lands, but, for the general farmer of Ontario, it will be too costly for profitable application when salt can be had at such a low rate and *will answer all the purposes of any other soda compound* (?) Since it has been generally discussed and tested to considerable extent in these counties, we shall give its general composition and specific

action on the soil and crops, so far as is permissible under our present restrictions of avoiding scientific terms.

Common Salt, like every member of this class, is itself a true fertilizer inasmuch as salt in its entirety is found in every form of crop; but its fertilizing powers are manifested not so much in the part of vegetables which it forms as in its influence in liberating other elements of the plant from the soil. In order to make this clear and to try to settle some doubts which exist in the minds of farmers with respect to the action of salt, we shall give this one more in detail than any of the preceding members of this series.

The base of salt is soda, similar to that used in washing and in making hard soap, which is united with a heavy gas called chlorine and a little of one of the elements of water named hydrodgen—these two gases combined are kept by druggists under the name of muriatic acid, formerly called the spirit of salt. This acid has a powerful attraction for water, which causes salt to keep moist, and gives it the property of melting ice and snow in order to get its water. When salt has been applied to land it quickly takes water from the air and soil becomes dissolved, the soda part acts on the insoluble vegetable part of the land and converts it into a state which renders it soluble. The soda thus set free, the acid part immediately acts on the lime and flint compounds in the land and sets them free to enter the sap and help to whiten the grain and stiffen the straw. The acid, after having given up its lime and flint to the plant, is once more free to act in the same way a second and perhaps many scores of times in the same season. In this way salt is more a digester of crude vegetable fibre and an agent to act on stubborn lime compounds than a manure. When the acid of salt attacks limestone it not only renders the lime soluble but causes it to let go the gas, with which the lime was combined, and this gas is taken up by the sap of the plant and goes to form either the charcoal of the stalk or part of the starch of the grain, or the sugar of the fruit as the case may be. Therefore salt is beneficial and applicable to a soil in proportion to the amount of raw vegetable mould and the quantity of lime which it contains. We should apply salt on land on which straw would be likely to lie down, on land that contains very little sand and much locked-up lime. To show how salt acts in stiffening the straw, we must remember that, as was said, the acid of the salt acts first on the lime, which being liberated immediately acts on flint compounds and renders the sand of the soil so soluble that it readily enters the sap and forms the flinty coat of the straw and covering of the grain.

The quantity to be used will vary with the nature of the soil, and may be said to vary from 400 to 800 pounds to the acre. The quantity generally used is about 600 pounds. Some have sowed with the grain, others after the roller, but, for all kinds of grain, the better time appears to be, for both fall and spring grains, when the grain begins to cover the ground in ordinary seasons, and in very dry springs a little earlier as it has the property of attracting moisture. It should never be used early in cold wet seasons, as it has the tendency to not only attract moisture but very much reduce the heat of the land, which is not desirable in a cold wet season. Therefore, we must see that dry warm weather has fairly set in before salt is used, else the chilling effect will counteract much of its good properties. To have some idea of the cold that is produced by salt, it is necessary to bear in mind that any body that passes from a solid to a liquid state takes up a great quantity of heat, and if that liquid passes still further and is changed into gas, a very much greater volume of heat is destroyed. Now, this is exactly what takes place when salt is put on land, it first melts into brine and afterwards passes into gases and soda. A familiar example of this is shown in the melting of ice, which takes up a large volume of heat, a further continuance of heat is needed to change the water into steam, and in this form it requires iron at a red heat to convert the steam into the gases of which water is composed; by adding all these separate quantities of heat, which were used from the ice to the gases liberated, we can form some idea of the cooling effects of salt in reducing the heat of the soil and attracting moisture, in our dry hot weather in summer. For roots, turnips especially, about the same quantity is used, and is sown on the surface before the ground is drilled for seeding, when it is thrown towards the centre of the drill, thereby holding moisture in the land to give the young plant an early and permanent start, while its acid, being covered away from sunlight, proves a deadly poison to any small insects

that might prey on the plant; mixed with ashes it is an excellent application around orchard trees, where the acid hastens the formation of sugar in the fruit.

On old meadows salt has, next to unleached ashes, the most beneficial effect in killing out mosses and giving a healthy vigorous growth to the finer grasses, especially clover and timothy.

Ashes.—The only other fertilizer which seems to call for special notice now is ashes, unleached and leached. On any kind of land ashes will be beneficial, but more particularly on heavy land with much black muck on the surface. Unleached ashes contain all the minerals needed by any form of crop, and, therefore, need only the equivalent of the portion of wood that was driven away in burning, to give them all the substances that are needed in any soil to grow a full crop. The value of unleached ashes on the farm can scarcely be over estimated when we know that they contain all that is needed in land except mould, that they hold in themselves the entire requisites for the growth of all our bread-bearing plants, except a few elemental parts which the air will furnish. We do not exaggerate when we say that unleached wood ashes stand second only to best yard manure.

Leached Ashes.—What has been said of unleached applies in part to leached, for the water, in the leaching, carried off only a little soluble matter, which is about twelve per cent. mostly potash. To form a just estimate of the manurial value of ashes and to urge farmers not to barter it for a bar of soap, we shall give a lump estimate of what they hold, even after the free potash has been removed in the leach-tub. Leached ashes are very often looked upon as an unsightly nuisance, near potash works, while in the light of true farming they are a pile of hidden treasure.

If we compare leached ashes by the light of science with a full crop of wheat, including the straw and chaff, we will see that all that the ashes lack to be equal to the grain crop is a little nitrogen gas, which is so abundant in our air that it forms seventy-nine parts in the hundred in our atmosphere. Who, then, will dare to undervalue unleached ashes as a fertilizer?

Substances in leached ashes.—In a cord of leach ashes will be found phosphate of lime, or bone-dust, sufficient to make the bones of about sixteen Clyde horses, potash enough to make two tons of wheat straw, flint sufficient to cover about forty tons of wheat straw, with large quantities of magnesia and manganese, charcoal sufficient to make starch and straw, and over a ton and three-quarters of limestone or chalk.

The constitution of ashes plainly shows what particular kind of soil they would have the best effects on, when it appears that the lime forms the great bulk of it; first limestone, next bone-dust, then magnesia, which is nearly akin to lime. From these facts ashes will have the best effects on sandy soil, next on dry clays, and least on land containing much lime, as is the case in this County of Huron. Grass is decidedly the best place to put it.

Charcoal.—Where soil has been very much impoverished and is very deficient in vegetable mould, so much so that a good crop of buckwheat or grass cannot be started, and when the land has all the mineral elements, but the owner cannot afford to give it a dose of barn-yard manure, the defect can be supplied in a small way by the application of charcoal, which may be made of any form of refuse timber, brushwood, or brambles, which will yield a better article when charred in the green state; in fact green wood chars better than seasoned timber, while the soil that has been used for covering is much more valuable when green timber is used, since green wood in charring gives off much more vegetable oils and acids than dry timber, and these are absorbed by the covering of the pile, which when spread will yield good results. But, when fresh, green timber cannot be had, any old wood may be used, with this difference, that where partially-rotted wood is used the covering should be clay or sand, or even leached ashes, for black or peaty covering will not be sufficiently close to stop the fire when charring has been completed. It is of no consequence whether the timber be large or small, as the fire, once established, will continue, if properly covered, until the largest log is charred through, which may be known by the steam ceasing. The fire once fairly started, no smoke should be allowed to escape and air entirely excluded, except a few small openings at the ground at the bottom of the pile. By selecting a natural hollow and making a large heap of any old and useless timber, with a few dry pine pieces near the bottom to serve as kindling, the whole covered

with straw, and that covered with a foot or more of fine clay, then kindled, a few thousand bushels of charcoal may be made that will stand in good stead on any worn down land and show its good effects for years. When green wood has been used the coal will require considerable pounding, but old tinder powders easily. The covering should be evenly spread since when clay has been used, it is not only rich in vegetable compound taken from the steam, but gains the power of taking large doses of ammonia and other gases from the air, hence this process is admirably adapted as a dressing for wheat fields. Any vegetable rubbish, prunings of trees and the like, can, with a little labour, be converted into a valuable and readily digestible manure, well worth the cost to owners of poor fields, or those who would raise fine and beautiful flowers.

We have gone over the ground in a curt and general, though imperfect manner, not at all satisfactory to the writer. Under the prevailing condition of a great number of our farmers, it cannot at present be bettered for the reason that comparatively few, except those who have had the advantage of a scientific education, could clearly understand this subject if we had gone into it as its merits deserve, in which case each article would require more space than is allotted to the entire group.

In conclusion I say, and say in earnest and with emphasis, to every farmer, read and study the science of your own profession, which is the most profound and beautiful under the canopy of heaven; and, to each farmer's son, go a few terms to the College at Guelph, and fit yourself to become an intelligent farmer, to know the why and wherefore of your every-day work.

NOTES TO THE FOREGOING.

On page 68, paragraph 3, where it is stated that where phosphate of lime has been used, plaster of paris will be found, means that when the phosphorous lets go a portion of the lime under the influence of the soil and growing crop, sulphur, which forms a stronger acid and is always present in the soil, takes hold of this free lime and produces land plaster.

Common Salt.—The effects of the use of salt in the neighborhood of Seaforth are that it has increased the quantity of straw, brightened and stiffened it, given the grain a brighter colour, and brought the crop in eight days to two weeks earlier. On potatoes it has added to the yield, and gives excellent results when sown over the drills before the potatoes have got over ground. Have never used it in the way recommended for turnips, and would not like to do so, because it would then be thrown into the centre of the drill and, coming in contact with the seed, would certainly poison it, so that it would never grow.

Salt on barn-yard manure.—Some farmers have got the notion that if salt is good on land it should be equally good in the manure heap before it is put on the land. This is a great mistake. Salt should never be mixed with yard manure, whether fermented or unfermented, for the following reasons: First, because when used on green manure it will check fermentation, and, when manure will not ferment, it cannot become food for plants, and is no more a manure than so much seasoned timber. The reason and modes of action are known to those who have studied the science of agriculture. Second, when applied to fat fermented manure, the acid of the salt will destroy the ammonia of the manure as fast as it is liberated and form a useless compound, thereby destroying the best part of the manure. This was proven some time ago on the Experimental Farm at Guelph, and any one may prove it to his satisfaction on a small scale.

The fertilizing effect on the soil by the addition of any of the manures, or the manurial agents mentioned here, will be in proportion to the amount and number of elements of plant food which they hold, or the power which they have taking food from the air. Good, fresh, barn-yard manure adds all that any soil needs, and is in itself a complete source of fertility, while salt, ashes, phosphates, plaster, and all of this class, except guano, add only a few special elements, and—though they add to continued fertility by helping to digest the crude matter in the soil, or taking ammonia or carbon gas from the air—still by continued use the crude supply will become exhausted and fertility fail without the application of yard manure, or vegetable matter in some form.

ESSAY ON THE HOMESTEAD: Its Arrangement and Surroundings, with regard to Convenience and Comfort, Combined with Economy, Healthfulness and Picturesque Appearance; Including Choice of Site, Dwelling-house and Offices, Water Supply, Drainage, Farm Buildings, Shelter-belts, Gardens and Shrubbery.

By David Nicol, Cataraqui, Ont.

To which was awarded the First Prize by the Agricultural and Arts Association of Ontario.

Notwithstanding all that has been written and said about the beauties and comforts of farm life, and although very many esteem it as an honourable calling and follow it with pleasure and profit, living in desirable residences, with handsome surroundings, contributing beauty and cheerfulness to the world around them; still as it exists in many places it is a laborious life, presenting few attractions to the rising generations, and it is much to be regretted that so many engaged in it look upon it as a drudgery at which they are obliged to eke out a miserable existence, living in houses which are generally untidy, inconvenient, comfortless and uninviting; and of course it follows that their children inherit an utter repugnance to the pursuit, and are often driven to seek some other way of gaining a livelihood more demoralizing than the worst system of farming.

It has been said that "the homes of a nation form a true index to the character of the people," and there is no doubt that this is to a great extent true. I have never seen a tastefully arranged homestead that was not occupied by a thrifty farmer, who loves his home; the love of home develops the love of country; the thrifty farmer is the true patriot.

It is within the reach of every one who owns a few acres of land, to have a comfortable and attractive home, be it ever so humble, no matter if the materials have to be plain and cheap, or if the buildings have to be small, the opportunity exists of having them tastefully arranged and surrounded by the beauties of nature, expressive of thrift and order; or of having them depressingly ugly surrounded by rickety fences and wrecked implements, the wood-pile at the front door of the dwelling, without a tree or anything that is pleasing to the eye; thus marking the difference between the intelligent and progressive farmer, and the dull, plodding sluggard, who seems to be but little removed from the savage who formerly hunted on the ground which he now occupies under the name of a farm.

In other countries where farms are only leased for a number of years, a tenant may make improvements which would probably be enjoyed by another of whom he knows nothing; but in Canada every farmer may be the lord of his own soil; therefore he can shape out for himself a home according to his means, which he has the right to enjoy during his lifetime, with the comfort of knowing that it may be enjoyed by future generations of his posterity.

There could be no general rule given for laying out a homestead, because so much depends upon the requirements, the means at command, the shape of the ground, the locality, water supply, etc., but I will offer plans which can be enlarged or diminished according to circumstances; not elaborate, because they would be suitable to only a few.

The Site.

On ordinary sized farms, as they are generally laid out in Ontario, the homestead has to be erected somewhat convenient to the public highway, which sometimes leaves little choice for the selection of a site; and if the sunny side of a hill which is most to be desired is not available, a slight elevation can generally be had. But if the dwelling-house must be erected on ground which is nearly level, the earth dug out from the cellar can be made to form a gentle slope from the house everyway.

Sometimes dwellings are built on lofty situations under the flattering circumstances of a clear atmosphere and a wide prospect, but it is often at the sacrifice of shade and shelter, which are needed in unfavourable weather. The comforts of a habitation should not be sacrificed for the pleasures of looking out of the windows upon distant landscapes.

Another very common mistake is made in building too near the public road; a house crowding upon the highway loses all its dignity and home-like repose; let no site be chosen because of its proximity to the road; select if possible a place combining elevation, eastern and southern exposure, natural trees, a pleasant outlook on river or lake, if such is in the vicinity, and make all else conform to it.

The house should be planned with a view to the securing of comfort and convenience, rather than outward attractiveness; I have seen some farm-houses very elaborately designed, with many gothic gables, highly decorated with carved work and costly ornaments, presenting altogether a very gay exterior, but internally, very deficient in essentials; a plain substantial building is more suggestive of lasting pleasure. True beauty consists more in correct proportions and adaptability, than in tawdry ornamentation.

The house inside should be arranged with a view to making house-keeping easy; good domestic helps are hard to be got, and they often detract from the happiness of the family, therefore it is of the utmost importance to the mistress of the house, that everything needed is made handy; the happiness of the farm-house depends very much upon the cheerfulness of the house-wife and if she is harassed with work and worried with household cares, it need not be wondered at if she becomes indifferent to the wishes and desires of others; a well-arranged, plainly furnished house, with a simple style of living, makes her light-hearted and hospitable; makes home pleasant and inviting.

Accompanying this is a design for a plain dwelling-house which could be made large or small according to requirements; there need not be so many fire-places as are indicated, if not desired, they could be dispensed with without altering the plan of the house; but the comfort and pleasure which the open fire affords me in winter causes me to recommend one for every large room in the Canadian home; they also serve as excellent ventilators.

The bath-room is placed near the kitchen so as to be easily supplied with hot water from the cooking stove, and cold soft water from the cistern which is under the kitchen; the waste pipe would join into the drain from the kitchen sink. The bath-room, although not a general accommodation, is a necessity in every farm-house; the practice of using bath-tubs in the bedrooms has several objections, and in winter, outhouses are often too cold and mostly always inconvenient; and if the river or lake be used, it is only the male members of the family who can judiciously avail themselves of it, and that only in the summer time. To keep the whole body clean at all times of the year is a religious duty, and if there are to be but five rooms in the house, one of them should be a bath-room.

The kitchen, as placed on the design, can be thoroughly ventilated, so as to be as cool in summer as it is possible for a kitchen to be, yet warm enough in winter; the quite common practice of removing the cooking stove from the winter kitchen and back again, is always attended with a deal of inconvenience. In the kitchen the sink is placed by the cistern pump; this is a matter which requires particular attention, unless there be a water-tight drainpipe leading from the sink to a cesspool at a considerable distance from the house. There cannot be a well of pure water near the kitchen, for a well receives the drainage from a distance several times the depth of itself; there is no doubt much disease is caused by the use of impure water for drinking and for cooking purposes; the clearness of the water gives no assurance of its purity: analysis has often proved that the germs of typhoid and other low fevers can be hidden in clear water; there should be no contaminating substance cast near the well.

The cupboard, which is placed between the dining-room and kitchen, with a door on each side of it, is a convenience, which, if once used, would never be dispensed with.

The sitting-room is large and well lighted, for as much of the leisure time is to be spent there, it should have in it a well-stocked library; there can be no class of people more benefited by reading than those engaged in agriculture. Part of this room could be appropriately used as a museum for preserved insects, dried plants, minerals, fossils, shells and stuffed birds, also philosophical and chemical apparatus, and other intellectual attrac-

tions. Homes furnished in this way would be productive of intelligent useful farmers, instead of idlers, spendthrifts and horse-jockeys. No farm home is complete without these means of education.

The parlour and dining-room could be arranged with folding doors between, so as to be made into one large room on necessary occasions, by having the fire-place put to one side. Each bedroom has in connection with it a closet or clothes-room.

The windows of a farm-house should be large to admit plenty of health-giving sunlight; with the exception of diminutive chimneys, nothing looks meaner than small windows, and now, since glass is good and cheap, there seems to be no reason why they should not be large enough.

Crowding other buildings upon the dwelling-house is a common error; we often see the carriage-house and sheds attached to and in line with the principal front of the dwelling-house, thus excluding any possibility of picturesqueness, for the sake of a convenience which should always be in the rear.

Another general mistake is painting with bright colours; soft and cheerful tints of lilac, rose, lavender, blue, buff, brown or gray are always far more pleasing to look upon. Especially is this so where an attempt is made at a landscape, even pure white does not contrast well with the green lawns in front, and the variegated foliage around, white soon becomes unsightly, showing every spot and speck; avoid bright colours, if you would have a picturesque homestead.

I have seldom seen a homestead with which the proprietor was entirely satisfied. It would have been somewhat different, and a little more convenient, if it had been properly planned before building was commenced. There is a tendency with some to lavish large sums of money on splendid mansions, without in any way improving the surroundings; a man erects a dwelling at an expense of several thousand dollars, but thinks it an outrageous imposition, if asked to lay out some hundreds in improving the grounds, planting shade and ornamental trees, etc., this is an egregious error; there can be little beauty where there is such a want of harmony. Property can be highly improved, and its value largely increased at a comparatively small cost, provided the improvements are carried into effect under the direction of a man of taste and understanding; otherwise it is highly probable that costly operations will but excite disgust. Much artistic display should be avoided, because it involves a deal of labour at a time when labour is much needed on the farm; it is folly to have a place artisticly laid out unless it can be properly kept in order; there is always difficulty in making domestics and children keep everything in such order and regularity as is desirable, for without cleanliness and order, confusion will soon prevail; with economical expenditure of labour, the grounds around a farm home can be made to look well without the entailing of a large annual expense.

The accompanying design may furnish some suggestions to intending builders:

The house is placed far enough from the public road so as to admit of a good lawn in front. The barn, in the basement of which is the cattle stables, is at a convenient distance from the house. The horse stable which has in connection with it a harness-room, and the implement and waggon house, which has over it the work shop, are placed far enough apart from each other, and from the barn, so that in case of fire some of the buildings might be saved. The sheep barn is placed convenient to the root-house, which is in the basement of the barn. The granary is near the roadway to be easy of access; the dairy is about half-way between the dwelling-house and barns, and the piggery, which should not be in connection with any other building where animals are kept, is near the orchard, because it is there the pigs should be allowed to pasture in summer, and should be far away from the dairy because of the foul odour and of the flies which gather about it.

There might be economy in building, as is urged by some, in having all those accommodations under one roof; but it would certainly not be practicable.

A workingman's cottage is near the stables so that the man could the more easily attend to the animals under his care. It is wise economy to have good cottages for farm labourers, and to employ married men who board at home; men who are steady and reliable, will stay longer in a place where they have desirable dwellings; then they become familiar with the work, and take more interest in their employer's business, and are worth more than men who are changing places every season; besides, farmers' wives should not

be required to keep a boarding-house for working men, they generally have enough to do without it, and it detracts from the comforts, and interferes with the privacy of the farm home.

Cattle Stabling.

The accompanying design of barn basement (Fig. 1) is calculated to accommodate forty-eight cattle, to be fastened with binding chain and ring on upright poles in double stalls. In this way they can lie down and rise up with ease, they have a good deal of liberty, yet cannot injure one another, persons continuing the barbarous old practice of fastening the heads between two upright bars, called bails or stanchions, are certainly liable to be prosecuted according to the law for the prevention of cruelty to animals.

There are also box-stalls for calves and calving cows, root-houses and feed room.

It will be observed that by this plan the manure can be easily taken away with a wheelbarrow.

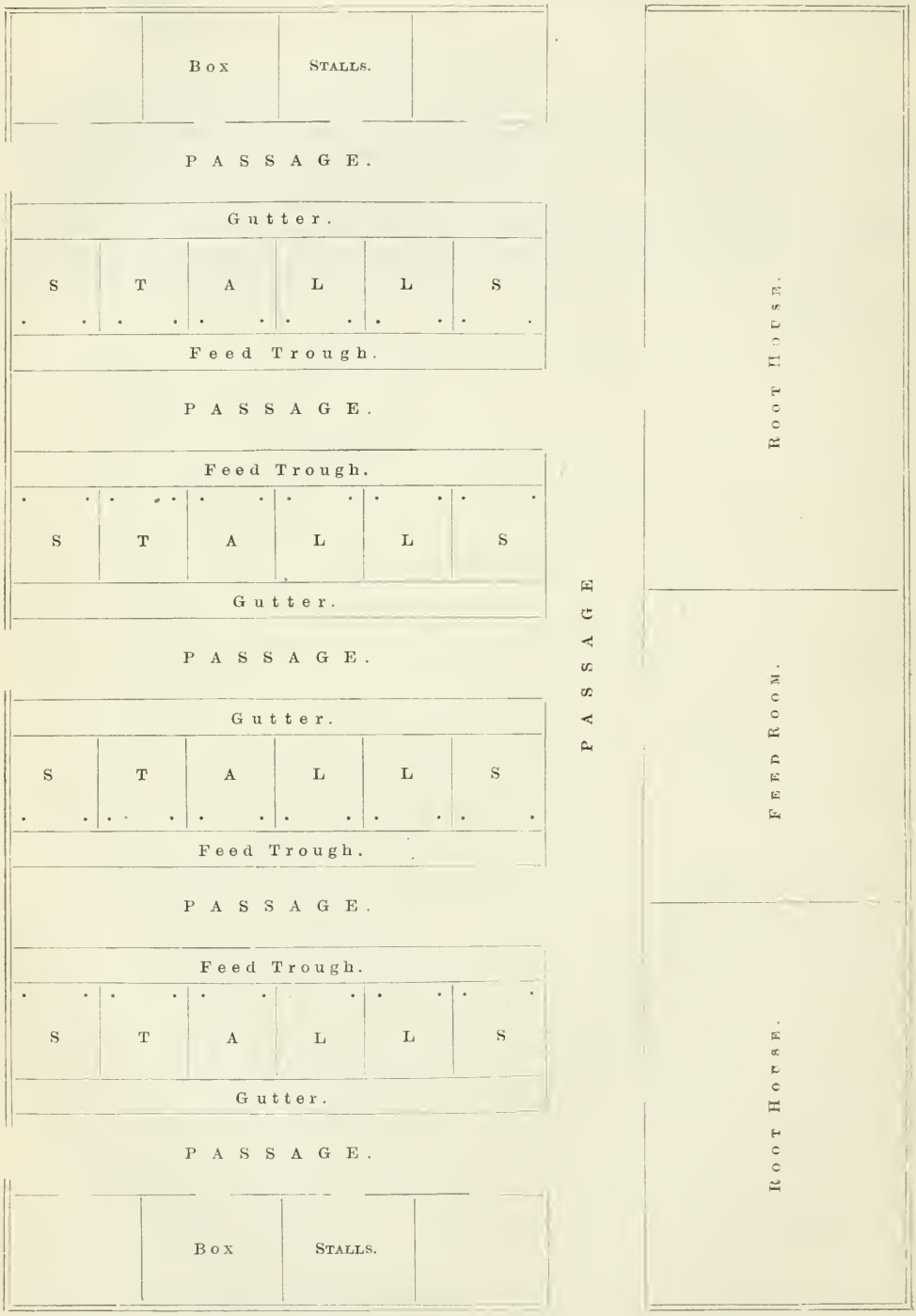
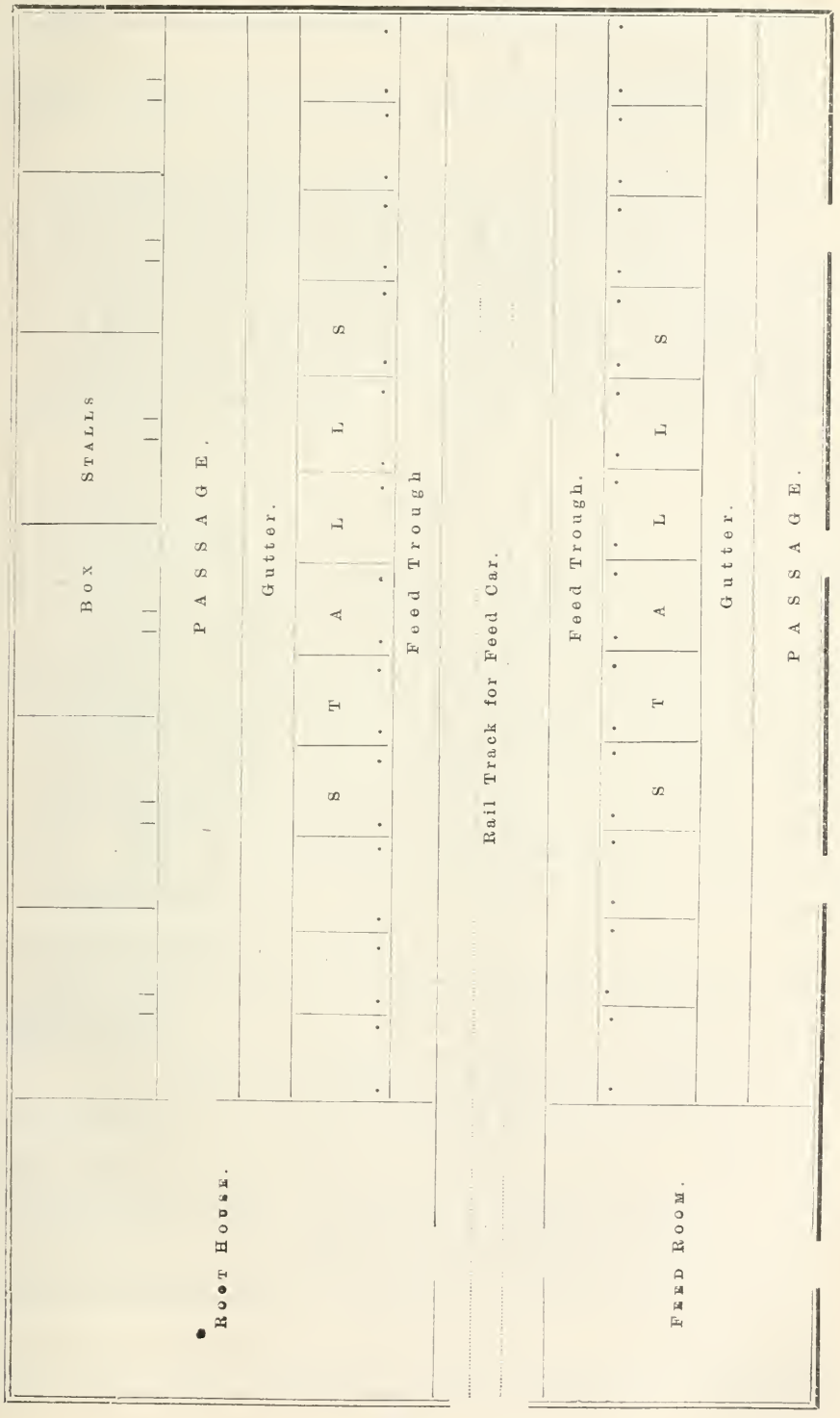

Box
Stalls.
PASSAGE.
Gutter.
STALL
STALL
Feed Trough.
PASSAGE.
Feed Trough.
STALL
STALL
Gutter.
PASSAGE.
Gutter.
STALL
STALL
Feed Trough.
PASSAGE.
Feed Trough.
STALL
STALL
Gutter.
PASSAGE.
Box
Stalls.
PASSAGE
Root House.
Feed Room.
Root House.

Fig. 1.



Another Plan—With Rail Track for Feed Car.

The facilities for keeping cattle stables thoroughly clean should be one of the foremost considerations; the fodder should be put down through shutes from the floor above. One ventilating tube, at least two feet wide, at each end of the building would be required to convey the foul air up through the roof of the barn. For a stable of this size there should be at least four large windows, made to draw down from the top; animals cannot be kept in healthy condition in badly ventilated stables, and they should have plenty of light.

In laying out a farm-house much common sense is essential, as well as good taste; novelty is apt to lead to conceits and whims, which sometimes afford pleasure of short duration by way of experiment, but that is only to be indulged in by those who have too much money. The desire of grandeur often leads to the common error of mistaking extensiveness for beauty. Neatness and uniformity of style are more productive of enduring satisfaction, a lack of harmony and proportion always makes a place look ridiculous—thus we sometimes see in the pleasure grounds in front of the dwelling; flowers, fruit trees, and ornamental shrubs, mixed indiscriminately with patches of corn and cabbage. We have also seen graceful natural landscapes, destroyed by being harshly cut into with straight avenues, and planted on either side with formal straight lines of trees, evincing a lamentable lack of taste and understanding; for however beautiful an object may be in itself, if it is out of place, it's beauty is always offensive to the eye of taste.

A grove of trees is one of the pleasantest components of a country residence—it affords a pleasant resort for the family in hot weather, a desirable shade for the enjoyment of out-door amusements, and has many attractions, besides adding much to the appearance of the place. Where groves of trees have been planted by nature, they should be carefully protected and thinned out gradually, for those of nature will always far surpass in grandeur the noblest works of art. In planting a new grove, the regular recurrence of particular trees should be avoided, the trees should not be planted at regular distances nor in straight lines, but scattered over the surface as if they had happened to grow there naturally, because it gives a more picturesque appearance. Wide spreading trees, such as the elm, oak, linden and maple, are best adapted for a shady grove because they form the best arch of foliage. Evergreens are very appropriate for small groups to be set around the skirts of a grove of deciduous trees, their form and colour make a fine contrast. Small groups of trees can be planted to much advantage along the lines of approach to the dwelling. If beautiful in themselves and appropriately situated, they have a fine effect in the landscape; each group should be of one kind. A few elms or maples planted behind the dwelling and showing their tops above the roof when approached from the front have a fine effect and any country house looks naked without them.

Flowering shrubs and plants are well adapted for ornamenting and beautifying the grounds more immediately connected with or in front of the dwelling house, they should also be planted in groups of similar species and colours, this gives more variety as well as strength and expression to their beauty than if planted in wild confusion; these groups, while distinctly separate on the lawn, should not preserve any regularity in shape or in distance apart, which gives an appearance of stiffness to the whole.

Flowers show to best advantage when planted in masses, consisting each of a separate colour, and when properly arranged they draw out the admiration of even the most tasteless.

Where a stream or brook can be brought into the landscape the effect is always delightful; the softness and quietness which it imparts, along with natural plants which generally grow along its banks, give a fine effect to the scene. Water is the life of the landscape, and should be made use of wherever possible.

Fountains where they can be had, without their usual artistic embelishments, have their appropriate places in picturesque scenery, but they must appear more as the works of nature than of art.

The Lawn in front of the dwelling must be made smooth, and kept closely cut by the lawn mower. Extensive forest-skirted lawns pastured by herds of well bred sheep and cattle add life and animation to the beauty of the scenery around the homestead.

By mixed grasses and white clover thickly sown on well prepared ground a good lawn can be procured the second season after sowing, but coarse grasses, such as timothy and orchard grass and red clover, must be avoided. They would never make a good lawn, and they prevent the growth of fine grasses. In small places sodding is preferable to seeding, because a finish can be made at once, and wherever roads or walks go through a newly-made lawn the edges should invariably be sodded; the edges should never be more than two inches above the level of the road or walk, otherwise they cannot be kept neat. On newly seeded lawns the mower must be freely used as soon as the grass or weeds are a few inches high, unless it be pastured by sheep.

Roads and walks about the homestead must be made hard and smooth, so that they can be travelled on in all kinds of weather; bad roads are a common cause of unpleasantness. Before the house is built, the roads should be graded and bedded with broken stone and covered with gravel; no person can enjoy life, even in a finely arranged house, if in order to get to it he is obliged to wade through mud three or four months of the year. Cleanliness and order are most desirable about the farm-house, and the less trouble it is to keep a place, the cleaner it will be kept. The proprietor must provide a place for everything, and see that everything is in its place—all breaches against order and cleanliness must be prevented.

Another very common mistake is made in planting trees directly in front of the dwelling-house, and very often that is the only place in which they are planted. Trees are useful and ornamental almost everywhere, except in front of the house. No farm-house should front to the north.

It is easily understood why any person would desire the shelter which trees afford to dwellings, and the shade which groves give in their proper places; but I could never understand why any person would have a thicket of trees close to the front of his house, unless it were to hide the hideous appearance of an ill-constructed habitation.

There are people who, through ignorance, imagine that their dwellings should be shaded from the sun, but it is a woeful mistake; the sun is the great purifier of the atmosphere, and should be allowed to shine into every room of the house, if that were possible: beds to be healthful should be daily exposed to the sunshine. If any rooms in the house must look solely to the north for illumination, let them be the parlour and spare chamber, because visitors for a short time can be cheerful even in a north-windowed apartment, but the constant dwellers need the sunniest rooms in the house. In very hot weather in summer a sunless house may seem delightfully cool; it is, perhaps, so with most caves and dungeons, but they are not conducive to healthfulness. The shade of trees in summer is desirable, as is their shelter in winter, and no person who has ever been a dweller in a house situated by shady groves will ever be contented living in a house where they are not; but there is a possibility of having too much shade. When we see children growing up in overshaded houses puny and white, like potato sprouts in a cellar, compared with those who have had abundance of fresh air and sunlight, it becomes evident that it is unwise to exclude the essential elements which God has permitted us the privilege of enjoying.

Trees are often planted thickly with the object of having their benefits as soon as possible. Young trees do best when planted thickly, but there is a common error in neglecting to thin out in time, and when once neglected they are injured by crowding, and in a great measure their gracefulness and beauty destroyed for ever. This is a very important consideration in the beautifying of a farm-house. A person begets a sort of fondness for the trees which he himself has planted, and will delay making the necessary sacrifice, and is often prevented by the sentimental pleadings by others of the family who do not understand these things. This affection for the trees around one's home is very creditable, and should be encouraged to a reasonable degree; but plantations of trees which are not thinned and trimmed systematically until they are large enough to take care of themselves can never be made to look well.

The Orchard.

Orchards are among the most coveted possessions; they are the most useful of ornaments, and profitable as well as useful. Unlike many things which are best at first, fruit trees increase in worth and goodness for ages; an orchard in bloom is one of the pleasantest sights the eye can behold, but how rich the spectacle of the autumnal harvest, even the perfume refreshes the dullest of souls. The orchard has charms and attractions for all, and few would wish to live on a farm where there is none. In Ontario we can have the apple grown to perfection, and the apple is by far the most important of all fruits; the many varieties are such that it can be had in good condition all the year round, and from strong acid to exceedingly sweet flavour, it can be had to suit the taste of almost every individual. As an article of food it is now considered to be indispensable, and its healthfulness as such really makes it a necessity.

Fruit growing in Ontario now forms a very important and highly remunerative branch of agricultural industry, and is likely to become much more so since extensive markets are being opened up in countries where it cannot be grown. There is only a small portion of this continent on which the apple can be successfully grown, so the demand is certain to increase, and it is doubtful whether land suitable for an orchard could be made to produce half as much profit in any other crop.

Now, although on the accompanying design the orchard is placed near the dwelling for the sake of convenience, it is only occasionally that the ground so situated would be suitable. I cannot here go into details on fruit growing, but must give a few practical hints. Fruit trees will thrive on almost any kind of soil provided it has a dry subsoil; a great deal can be done in the way of draining, and poor land can be made rich, but low level land on wet bottom can never be made suitable for an orchard. The most suitable land for the apple, peach, and cherry is a loamy soil with a gravelly bottom on an elevated position. If a field of such soil cannot be had, get that which nearest approaches to it. Pears, plums, and grapes do best on clayey loam on an inclined situation, thoroughly drained, and protected from northerly winds by hedge rows of evergreen trees; there are but few farms on which a field of this kind could not be had.

The Garden.

There are comparatively few gardens in connection with farms in Canada. The reason generally given for the deficiency is the want of the necessary time to keep them in proper order. It is true that in the spring of the year the farmer's time is precious, and a roughly kept garden affords very little satisfaction. The old fashioned way of laying out a kitchen garden in squares or oblongs, and every square or oblong again divided and subdivided into beds, and borders formed all around the squares for fruit trees and bushes, involves a great deal of unnecessary hand labour; a much larger quantity of fruit and vegetables can be grown on the same space of ground by the long row system, and at one-tenth the cost, because nearly all the work can be done by the plough and horse cultivator and other labour-saving appliances. In a garden laid out as in this design, all kinds of fruit and vegetables can be profitably raised, so there need not be any excuse for depriving a family of the luxurious products of the garden. Dwarf pears, plums, grapes, gooseberries, raspberries, stawberries, and currants should all be planted in long rows, so that they can be cultivated with the horse hoe, even if there be but one row of a kind. I have seen a man spend as much time dressing a few beds in a small garden as would be required to keep in thorough good order an acre worked with horse implements. Is it not surprising that the more economical system has not been more generally adopted?

The soil most suitable for the garden is that of a loose, loamy nature, which is not injured by being worked in wet weather. Clay soil must not be worked when wet, and it cannot be worked when dry, but thorough draining and high manuring naturally changes its nature; but if a piece of ground containing the different kinds of soil can be appropriated for that purpose it would answer better than if all of one kind.

BIRDS-EYE VIEW OF HOMESTEAD.

PLAN OF HOMESTEAD.

A—Stair to cellar entrance.
B—Stair to servant's bedroom.
C—Entrance to coal cellar stair.
D—Cupboard, which opens into both dining-room and kitchen.
E—Fireplaces.

PLAN OF DWELLING-HOUSE.

The Live Stock.

A very true indication of the character of the farm is the quality and condition of the animals he keeps around him; good farming is almost invariably associated with good stock, and to a man of cultivated taste there are few more prolific sources of enjoyment. All the different breeds of cattle, sheep, swine, and poultry have their admirers, who claim superiority for their breed, and doubtless each breed has its particular merits. There can, however, be but one breed of each kind kept to advantage on any ordinary sized farm; it requires wisdom to judiciously select which is the best suited to the place and circumstances. By attempting to raise several breeds at the same time, many an enterprising man has failed to earn a reputation for being a good breeder of any kind.

Another common error is changing frequently from one breed to another, as man cannot in one short life thoroughly test many different breeds of each kind. But by devoting his energies to the improvement of any one breed, he cannot fail to have satisfactory results.

The farmer who desires his son to remain on the farm will certainly find the breeding of choice animals one of the most effectual inducements. It has powerful attractions for many, and they who see no beauty in these things are now fewer than in former times. One of the most encouraging hopes for our country is the prospective improvement of its live stock.

The Neighbourhood.

One thing much to be desired is a good neighbourhood. Ordinarily the farmer can have but few near neighbours, and if they are disagreeable he cannot among them have the enjoyment of social intercourse, and to most of well-disposed men that is a serious deprivation. The envious and selfish man who is chagrined at his neighbour's prosperity, can be let alone.

From the dishonest, the liar, and the slanderer the law in some measure protects him; but the talebearer, whose chief delight is ingendering strife and disaffection, can keep a whole community at enmity without laying himself amenable to law, and cannot be avoided. Talebearers are worse than liars, because they generally do their iniquitous work under the guise of kindness and charity. The upright and generous man, however, has seldom to complain of bad neighbours. Tattlers cease when they get no listeners; those only who are lovable will be loved by their neighbours.

In a well regulated farm-house the true enjoyment of life will be more readily found than in that of any other pursuit. There is not the excitement of the speculator or the stock-broker, the harassing cares of the merchant or manufacturer, nor the perils and dangers of the seafaring man; the pleasures of the farm-house are more real and more lasting than are those of the dwellers in the city. The rise and fall of trade and commerce affect the farmer less than any other class: famine would come to them last of all. It may not be the quickest road to fortune, but it is the surest road to competency. Few farmers make large fortunes, but many accumulate wealth, and nearly all are able to pay their debts; while of the mercantile and manufacturing classes about ninty-five out of every hundred have failed once or more times in their life. Almost the only failures among the farmers are of broken down tradesmen and others, who have engaged in it with very little knowledge of the business.

There is in farm life less temptation to dishonesty and fraud than in any other pursuit. There is no way in which a man can better serve the purpose for which God created him than to expend his energies in beautifying his country and increasing its productiveness—"making the desert to blossom as the rose."

ESSAY ON THE HOMESTEAD: Its Arrangement and Surroundings, with Regard to Convenience and Comfort, Combined with Economy, Healthfulness and Picturesque Appearance; including Choice of Site, Dwelling-house and Offices, Water Supply, Drainage, Farm Buildings, Shelter-belts, Gardens and Shrubbery.

By John McClure, Brampton.

To which was awarded the Second Prize by the Agricultural and Arts Association.

As the homes of a country are, so will the condition of that country be. The main spring of stability lies here, more than in its halls of legislation; for no matter how wisely the laws are framed, they cannot bring true prosperity to a country, except the minds of the many have a right bent, and home is the place where this, or the opposite, in a large measure is given. It is therefore very important that the surroundings of home should be of an elevating character.

Of the many homes on earth, none possess more natural advantages for training the mind in virtue's way, than the well appointed one on the farm. "Homestead"—the simple mention of the word awakens tender memories in the mind of those who have passed their childhood and youth on the farm. The farm home with its belongings makes a deeper impression, and begets a stronger attachment to it, in the youthful mind, than the one in town or city, for the reason that on the farm the distractions are fewer. The house, barn, orchard, woods and domestic animals are, for a few years of the first of life, the young mind's world. They are therefore clothed with that particular charm which only the embryo mind is capable of giving, and in this light they are indelibly impressed on the susceptible mind, so that a long lifetime of dealing with a practical world will not altogether dispel the charm and good tendency of those early, simple, and pure associations.

The conditions which constitute a model farm-house and surroundings might be summed up in the three words, viz.: convenience, beauty and economy. All the desirable points might be classed under one or other of these three heads; for instance, convenience is a synonym for comfort. Before going farther it would be in order to remark, that the prudent farmer will be governed in his undertakings, especially in the ornamental line, by the amount of capital at his command. The farmer who allows his wife to carry water a distance of one or two hundred yards, when it is to be had near by for the digging; or with pails, pots and pans to catch the droppings of every passing shower, and at the same time has money rusting in the bank, is not worthy the name of a man. If on the other hand the capital be low, and the idea strikes the ambitious farmer, that he would like to beautify his lawn, unnecessarily enlarge the house, or embellish its furnishings on a large scale, and he thinks of placing a mortgage on his farm to carry it out, we would emphatically say, "don't;" but to provide ample protection for all implements and vehicles, both in winter and summer, or to provide healthy and comfortable stabling for stock and the like, a mortgage of a few hundred dollars might be admissable.

A palatial residence with gorgeous furnishing and superb grounds is not the only place where beauty and good taste are evidenced. Refined taste may leave its impress so plainly on the humblest home, that it can hardly escape the notice of the most unobserving. Though the house be small and plain, let not the idea rule, that all effort at beautifying it and the surroundings would be like "wasting sweetness on the desert air."

It often happens that the present owner or occupant of a farm has had nothing to do with the planning and locating of the house, farm buildings, etc., that having been done before he came into possession. It may be that they have been situated and arranged in the best possible way, if so, the happy owner is to be congratulated. Sometimes this is not the case; it remains then to make the best of the situation. If a readjustment be practicable, and an improvement in this respect could be gained by doing so, the operation

would prove ere long, an economical and satisfactory one. Supposing there be a clean sheet, so to speak, to begin with, in regard to buildings the first move in the matter is the selecting of the best site available. The principal points to keep in view in doing so are at least, sufficient elevation of ground to permit of thorough drainage of cellar, waste and surface water. The cellar, to be worthy of the name, must be perfectly free from water the year round. This in ordinary soils can only be secured by a good covered drain sunk a little lower than the foundation. Second, a convenient relation to the highway and the farm. Third, appearance. Unless the first be secured the health of the family will be endangered ; the absence of the second, will be a continual source of annoyance, and waste of time and strength ; the third, though not so much an absolute necessity as the first, is important, as all are more favourably impressed by a good appearance, and have the reverse, though the difference may be only in what meets the eye. Therefore, placing the buildings in a way and on a place where they will appear to the best advantage is making the farm more valuable.

The dwelling-house, if the means permit, should be large enough for the comfortable accommodation of a large sized family, although the person building it should not be favoured with such. The possibilities are to be taken into account. To build an unnecessarily large house on the farm is an exceedingly bad investment. It is against economy, not only in the first outlay of building, but in being a continual source of expense as well, without any corresponding advantages. Such a house is not suggestive of convenience nor comfort, and for beauty ; an overdone or incongruous thing is never really beautiful. A large house in town may not be so much a dead investment, for several reasons. Convenience, we will make the ruling principle in the dining-room, pantries, kitchen, and wood-house. These parts must not be so situated as to require two steps of the female portion of the household in their many daily trips from one to the other when, by a proper arrangement, one could be made to serve the same purpose. This principle should of course, as much as possible, rule through all the house. Pure air, however, we make the key-note for bedrooms, and sweet cleanliness for cellar. We suppose these vital requirements which are second in importance to godliness, to go hand in hand through the whole system under consideration. We attach them in particular to those parts as the leading requisites, because there the note of warning on these points may be most needed Bed-room windows should open from both top and bottom; and no vegetable matter should be allowed to decay in the cellar, nor any impurity be tolerated there, because it may not be so much exposed to view as if in other parts of the house. The condition of the cellar is a very good test question on thorough house-keeping.

Open fire-places or grates are very desirable in sitting-rooms, as they are the best ventilators, and in the half-and-half weather of spring and fall, a crackling wood fire on the hearth disperses the gloom of a dreary afternoon and evening with marvellous power.

Water is an important article in household economy, and both hard and soft should be at hand. The cistern should be in the most convenient place, not to interfere with sanitary laws. Keep it from under the kitchen floor, even if that should necessitate a few extra steps ; but if a quiet corner is available near by, the pipe of a pump can be made, if desired, to bring a supply into the kitchen of that article so dear to every good house-maid's heart. The waste water of the kitchen, such as soap suds, would be better thrown at the root of fruit trees, or on the vegetable garden, than in a sewer for two reasons, viz. : profit to the fruit and vegetables ; and no danger from poisonous gases would be incurred. By all means let there be provision by well or cistern, or both if necessary, for watering stock in winter time without its having to leave the yard, although there be a stream not far off. It is far from economical to oblige the stock, especially the milch cows, in cold blustery weather to go a hundred yards or so, seeking water amongst the snow drifts, not to mention the cruelty to animals. They will put it off till compelled by sheer necessity, and then go reluctantly and return trembling, and shaking their heads, before having their thirst half satisfied. In warm sunny days, the objections, though different, are quite as strong. Instead of hurrying away from the stream they now linger around it, all their spare time, and there is a waste, not of flesh, so much in this case, but of manure, which is dropped where the spring floods take it away and so is lost, a thing

that cannot be tolerated on a well conducted farm. Convenience requires the out-buildings to be somewhat close to the dwelling-house—say about fifty yards, or as close as is in keeping with safety from fire. If properly kept, there will be nothing offensive arise from them at that distance, and with practical beauty a well stocked farm yard is quite consistent—indeed is rather suggestive of solid comfort, than otherwise. They should, if possible, be in a northerly or north-westerly direction from the house so that in general the entrance to stables would face both towards the house and the sunny side, and also that a view may be had from the house into the open farm yard. This yard should be partially covered from view of the house by trees planted between. To be totally hid is not desirable. A good belt of trees, however, would take away the over prominence of yards and out-buildings, and also make a good cover to shelter the open side of the yard. To describe minutely a plan of dwelling-house, or farm building, we consider out of the scope of this essay. We treat the subject more as a whole, laying down general principles on the different points and in some cases attaching a few details. Then whether the out-buildings be large or small, few or many, let them be kept neat, and in good repair. Let no doors hang on one hinge or swing to and fro, making the "constant creaking of a country sign." The barns and stables should be as compact as possible. On their arrangement and relation to each other depend the ease and speed of feeding stock. Whether there be cellars or not, the foundations should be of stone and lime, and if this cannot be had all round, let stone walls be built under all doors, especially where cross-ways are needed. To put wooden sills under such doors is nonsense. Farm buildings are not complete without a root cellar, the size of which should be in proportion to the adaptability of the farm for root and stock raising. We would prefer to have the horse stable above ground as it is almost impossible to have the air as dry and pure in cellar stables. These stables, as a rule, are warmer than those above ground, and if well ventilated, for stall feeding purposes, they are perhaps better adapted, as a certain amount of food is required to keep up the heat of the animal, less of which would be necessary, if the stable supplied part of that heat, or more properly speaking, kept the heat from escaping too rapidly. With horses the heaping on of flesh is not the principle object. They want to be kept in health and strength, sound in wind and limb, if possible, year after year as long as they live. To have the stables a little too airy is not so prejudicial to this, as to have them badly ventilated. A horse cannot come out vigorous in the morning, if he has been breathing poisonous air all night. If anyone doubts that assertion let him sleep in a badly ventilated room or railway car, and be convinced. Horse flesh is no doubt heir to many of the ills that the human is, and from the same causes, in such cases as breathing bad air. The horse stable should be well ventilated, dry, clear and comparatively warm; for fattening purposes, warm and well ventilated.

The outbuildings should cover no more ground than is necessary, and consequently the square yards of roofing will be reduced to a minimum. An improvement in their appearance would be gained by painting them, which would also afford protection to them, but whether the dollar and cent gain from this would balance the expense of keeping up paint on coarse boards, I am not prepared to say. The driving-house and sheds should be apart from the stables and barn. The place should be somewhere about the inner end of the lane, or if there be a barnyard lane and a carriage drive, it should be near the junction of the two. Such buildings may be classed with the necessaries, and it should be made a point to have implements under cover every possible hour they are not in use. The days of implements wintering, or summering for that matter, in the fence corner, and milch cows in the open barnyard—two things that often go together—are past events, let us hope, in the history of Ontario's farming.

Circumstances such as the lay of the ground, the shape and size of the farm, &c., must, in some cases, regulate the distance between the buildings and the road. A farm is a large building lot, and, therefore, a house on the road side is not symmetrical; neither is it conducive to good appearance, nor convenience, to have them far back. If the ground rises well up from the road, the buildings could be placed a longer distance from it, without detracting from their appearance, than if the ground were more level, or the opposite grade were the case. On a square hundred acre farm, other things being suitable, about seventy or eighty yards would be a very good distance. At that distance

a lawn of about the same width would make a beautiful front. If the house be from the road a distance of from 100 to 200 yards, it would be more economical to make one lane up to the front plot serve in common for both house and barns. Supposing the former to be practicable, a convenient and beautiful plan would be to have the lane to barns on one side of front plot or lawn, and separated from it by a hedge of some sort. English thorn is pretty if it can be got to thrive ; privet has the advantage of being easily grown. A thick row, or double row of trees, such as maples, elms and hickory, would be the proper thing for the outside of the lane.

Where the concession lines run north and south, or thereabouts, which they generally do, the lane and belt of trees will be on the north or north-west of lawn, if the buildings are situated as above recommended, thus affording a valuable shelter to house, lawn, shrubbery, vines, fruit trees, and the open side of the farm-yard, as the belt of trees, as before intimated, would be continued past the house, only sparser where it passes between the house and barns. At this point it may be necessary to swerve the row from the straight line it will follow by the side of the lane, in order to adjust it to the requirements of the place ; and it is possible appearances may be improved by doing so, in breaking the monotony, as straight lines are not always the most pleasing to the eye. One large gate could, if desirable, be made to serve as an entrance from the highway to both barns and house, by being placed at the corner of front plot, opposite the lane. The carriage drive to the house, in this case, would diverge from the lane near the entrance gate, and curve around towards the centre of the lawn, touching the footpath near the house, and then curve around towards the barns, forming a junction with the inner end of lane. At a point somewhere between where the drive touches the footpath and the junction referred to, a branch might be made to turn down towards the highway, and fall in again with the drive, making a turning place when not going on to the drive sheds. This would form a pear-shaped loop, which would make a very good croquet ground, as those not taking part in the game would be afforded an opportunity of looking on, under the most favourable circumstances, the only ones, perhaps, where the lengthened act is really enjoyable, viz., from carriages behind beautiful teams, if this does not sound a little too luxurious to the canny farmer. The principle is all the same, however, whether the carriage be a $100 or a $1,000 one. The pedestrian's gate would be opposite the front door of the house, and connected therewith by a straight footpath. Of course, we deal in generalities ; taste and circumstances must arrange the details. All the front plot, except that taken up with drives and paths, need not be a grass lawn. A narrow piece on the south side, or the opposite side from the lane, cultivated and bearing a row of grape vines, would make a profitable and beautiful border there. The corner towards the house, on the same side, could, with charming propriety, be occupied with bushes of small fruit, strawberry beds and dwarf fruit trees. When at it, we may as well settle the fruit question.

In the fruit department, including the apple orchard, the aim should be rather to have the best varieties, well cultivated and cared for, than to have a large number with the opposite conditions. An orchard of naturally poor fruit, should be treated like the fruit tree of the parable, only without the reprieve, as no amount of digging and dunging will convert crabs into large, well-formed fruit. Satisfactory results will not be realized from the best varieties if, in the early part of summer, the fruit garden and orchard be turned into a paradise, not for the family and their friends, but for all sorts of caterpillars and creeping things ; or if dead limbs are allowed to remain among the living, an abundance of which may be expected, if the former carelessness be practised. The sum of the matter is, when getting fruit trees get the best, and no more of them than can be well cared for. The kinds we consider the most beneficial are—apple, currant, grape, pear, strawberry, and, before the black knot became so prevalent, cherries had the recommendation of being easily produced. From observation, we do not think the common cherry exerts so salutary an influence on the human system as the kinds above mentioned. The English cherry is a very fine flavoured fruit, raw, canned or preserved. They have, however, rather too much of Josh Billing's Shanghai hen in them, hanging around not doing anything.

To return to the front plot, the part that is not occupied in the way indicated, will

be a lawn, open places of which should be dotted with ornamental shrubs. The trees planted along the highway should be of the more ornamental kind, than those on the outside of lane, such as horse chestnuts, spruce, balsam, &c. A few flowers at the front of the house are necessary to complete the toilet of the front surroundings we have been describing. Morning glories, and others of the same genus, are great beautifiers of porches and exposed windows. Sunflowers are not to be despised when in their proper place, that is, on the back side of the house. If slops are thrown from the back door of the kitchen, which will sometimes happen, a clump of sunflowers near the place would act as an absorbent, thus checking any deleterious tendency this may have. Hens, too, dispose of the seed with a keen relish. Those troublesome hens and the vegetable garden loom up together, and float like a troubled dream across the mind. Melon beds, nicely planted, and hens luxuriating in them, are indissolubly associated in the mind. These two things, both important factors in the well-being of the family, are in a measure antagonistic. The case stands thus—no hens, no fresh eggs at hand ; hens at large, dishevelled garden ; hens confined, advantages of hens on the farm lost—no vegetable garden, no complete homestead. The goodman generally solves the problem by hastily passing the death sentence on the hens ; nevertheless, is the first at breakfast time to request that the eggs be passed this way. His better half will likely be inclined to compromise the matter by a good deal of "shooing" and "redibbling"—not a bad plan if it can be carried out with sweetness of temper, that excellent lubricator for the wheels of care. As a solution of the difficulty we would say that there should be a roomy enclosure of some sort, fitted up, in which hens may be kept at certain seasons, when their depredations become unbearable. At planting time, if they be kept closed up till the garden becomes firm and settled, they will not trouble it afterwards. They will then gratify their scratching and rolling propensities in the leached ashes or chip yard, where they may harmlessly work off their surplus energies, and be all the better for it. At ripening time they may make too free with tomatoes, and the like—they can then be sent up for another term of durance vile. By this plan their predatory and wanton proclivities are kept in check ; and those short terms of confinement do not much interfere with the laying side of their character, nor with the other advantage from running at large, the making of their living, in a good measure, from matter that otherwise would be wasted, as scattered grain will keep through these terms of confinement.

The vegetable garden should be well drained, free, at least, from surface water, and consequently it would be friable and open to admit the air. This, with weeds kept down, and the often stirring of the soil, are the principal requisites to the success of the vegetable garden, taking for granted its own fertility is up to a fair average. It is not necessary to keep the vegetable garden hid away from view—if well kept it is an ornament to the house. It would come in to the rear of the fruit garden, at the opposite end of the house from barns, with propriety and convenience.

A thing often neglected, and one which makes good returns for the cost, is an ash house—a little brick or stone enclosure, with no wood about it but the roof. It would not cost much, and would save the ashes, an article too valuable as a manure to be wasted, and, if kept in the wood-shed, or any back nook connected with the house, that house, like the enchanted one in the "Arabian Nights," will be found some morning to have disappeared through the night.

The bath and library are investments that return solid dividends in increased vigour, both of body and mind. An isolated room, provided with means of heating, will answer for a bath room. There should be an outside door to library room, so that it could be readily entered from farm buildings. It would then serve conveniently for an office as well. A supply of good general literature is more indispensable in the farm home than the one in the town, because other means of nourishing the mind in this respect, are fewer. For the same reason, better results will flow from the country library, owing to the quietness of the long winter evenings. A room known by the dignified name of library or office, would give prestige to the farm house, and if furnished in a way to correspond with the name, that is, with writing material, account books, and a tolerably well-filled book case, and the same well utilized at spare times, the good will not lie in name only, but in the mind being built up, furnished and polished, an acquisition quite

as desirable as dollars and cents. The real or imaginary want of this is where the shoe pinches the sensitive boy, and is the principal reason, no doubt, for his becoming discontented on the farm, a thing which we sometimes hear of. The city boy shows a sleeker surface for the amount of capital invested, and thus puts the simple country boy altogether out of conceit with himself. We would like to pat the latter on the head, and say to him, make a good use of the library and your spare time, after you have bidden good-bye to school, not that you may be able to flaunt your attainments, but that the time may come when you can conscientiously respect yourself, even in the presence of the city chap, notwithstanding the superior airs he may see fit to put on. It is hardly necessary to say that great pains and discrimination are required in the selection of books. There is no time in this busy world for reading trash, not to mention the evil effects of such reading. There should be books and papers on agriculture, in its different branches and adjuncts. The want in this line does not end here. Most of natures have a want which requires a more ideal literature to satisfy. The book with beautiful touches of imagination in it is a source of actual strength to some—to many a one, no doubt. Whether the library be large or small, the Bible must be given the first place; the Bible must be rudder, chart and compass, in directing the household, not so much, of course, in the sweeping and dusting sense; but in the deep undercurrent, so to speak, which lies below each individual life, family and country, if the best is to be made out of this life, and also of the one that is to come. That being the case, we have no doubt but that the stock of men and women growing up on the farms of this "Canada of ours," will be such as would be an honour to any nation.

DOMINION AND THIRTY-SEVENTH PROVINCIAL EXHIBITION.

The Dominion and 37th Provincial Exhibition for 1882, under the management of the Agricultural and Arts Association, took place in the City of Kingston, commencing on the 18th and closing on the 23rd of September.

The Provincial Grant was this year supplemented by a grant of $5,000 from the Dominion Government in order to give it a Dominion character, with certain conditions as to apportionment—$1,000 to go to Manitoba, and $1,500 to the Maritime Provinces, if represented.

Manitoba made an excellent exhibit of cereals, roots, grasses, specimens of soil, and other productions, and the collection was under the control of Mr. Ashton Burrows, Deputy Minister of Agriculture, assisted by Mr. Keith and Mr. Riddel of that Province. A new building was erected on purpose for this exhibit, and it formed one of the principal attractions of the week.

Nova Scotia also made an excellent show of minerals and manufactures with some live stock, and this exhibit was under the management of Prof. Honeyman, of Halifax.

A large amount of the Dominion Grant was expended on medals—gold, silver and bronze, and were given to all sweepstake and herd prizes, as well as to other articles of merit, thus distinguishing this from ordinary Provincial exhibitions, and this distinguishing feature seems to have given universal satisfaction.

The following is a statement of the amount of competition in the several classes, compared with the four previous exhibitions :—

Horses.—The total number of entries was 348, for which was paid in prizes $1,211, 8 gold, 17 silver and 1 bronze medal, against 749 entries in London in 1881, for which was paid $1,653—740 in Hamilton in 1880, 492 in Ottawa in 1879, and 816 in Toronto in 1878. The small number of entries compared with the four former years is attributable to the fact that in the immediate vicinity of Kingston and east, few horses of sufficient merit are kept, those exhibited having to be brought from a distance at great expense. The horses that were exhibited however were very fine, especially in roadsters, driving and heavy draught horses.

Cattle.—In all classes there were 620 entries, for which was paid in prizes $2,982.50 in cash, 10 gold and 17 silver Dominion medals, against in London in 1881, 656 entries, to

which was paid $2,798, 424 entries in Hamilton in 1880, 618 in Ottawa in 1879, and 640 in Toronto in 1878, from which will be seen the cattle exhibit was grand; Shorthorns were well represented; Herefords made the best show ever presented at the Provincial. Devons also were well represented; Ayrshires a magnificent show; Galloways very fine, and all of them imported animals; Polled Angus were so well represented that the Council enlarged the prize list; Jerseys were also well represented both in numbers and quality; Holsteins, there were no entries; of Grade cattle there was capital show, and of fat cattle a magnificent exhibit. The Ontario School of Agriculture also showed for exhibition only some fine fat steers and sheep for shipping purposes. The Prince of Wales' prize this year was for a herd of fat cattle for shipping purposes under four years of age, and the *Farmer's Advocate* prize was for five cows for general purposes; both these prizes were keenly contested. For further particulars see prize awards further on in this report.

Sheep.—There were 354 entries, for which we paid $1,279 and 8 silver medals, against 705 entries, for which we paid $1,381 at London in 1881, 675 entries in Hamilton in 1879, 431 in Ottawa in 1878 and 659 in Toronto in 1877. The same reason for falling off in numbers is given as for horses—the distance from Kingston to the breeders in the west. The show, however, was excellent.

Swine.—In all classes 343 entries, for which were awarded $1,031, 5 silver and 10 bronze medals, against 386 entries, for which was paid $1,007 in London in 1881, 407 in Hamilton in 1879, 355 in Ottawa in 1878 and 471 in Toronto in 1877, a very fine show and hardly any falling off in numbers, the money prizes larger than before, and the show magnificent in quality—the Suffolks leading off in number this year, followed closely by the Berkshires.

Poultry.—321 entries, to which were paid $345 and 2 Dominion bronze medals, against 632 entries and $321 in prizes for London in 1881, 821 in Hamilton in 1879, 460 in Otttawa in 1878, and 821 in Toronto in 1877; quite a falling off in numbers accounted for by being east also. An entry fee of twenty-five cents a pair was charged this year for feed. The display however was excellent.

Agricultural Implements, Tools, Carriages and Sleighs, 377 entries, to which was paid $387, 1 gold, 4 silver and 15 bronze medals, against 615 entries, for which was paid $665 at London in 1881, 370 entries in Hamilton in 1880, 470 in Ottawa in 1879, and 585 in Toronto in 1878, showing this to be a variable class. The articles on exhibition were very fine indeed.

Agricultural Products, consisting of grain, seeds, field roots, dairy produce, sugar, bacon, domestic wines, &c., total number of entries 933, for which was paid $1,518, 1 gold and 3 bronze medals, against 1,078 entries, for which was paid $1,510 in London in 1881, 1,310 in Hamilton in 1880, 1492 in Ottawa in 1879, and 917 in Toronto in 1878. The show of grain and seeds was good. The dairy exhibit splendid; the success was in a considerable amount due to the active co-operation of the Eastern Dairymen's Association, and their contributions. Cheese and butter were manufactured on the ground. The show of honey and maple-sugar was small but of good quality; only a small show of domestic wines, but they were of good quality.

Horticultural Products—Consisting of fruits, flowers, and garden vegetables, 2,352 entries, for which was paid $1,207 and 12 Dominion bronze medals, against 2,631 for which was paid $1,510 at London in 1881, 3,999 entries in Hamilton in 1880, 2,252 in Ottawa in 1879 and 3,223 at Toronto in 1878, showing a falling off from previous years; still the show was good, especially of fruit.

Arts and Manufactures.—Articles were arranged under the following classifications: —Fine Arts, consisting of oil paintings, water colours, crayons, pencil drawings, statuary, photography, architectural drawings, &c., then natural history and mineralogy, ladies' work, useful and ornamental; chemical preparations, &c., manufactures such as musical instruments; building materials, cabinet-ware, machinery, tools, sewing machines, metal work, stoves and castings, saddlery, harness, trunks, shoe and boot-makers' work, wearing apparel, furs, woollen and cotton goods, groceries and provisions, &c. There were 1,859 entries, to which were awarded $1,746.50, 1 gold, 10 silver and 12 bronze Dominion medals, against 1,923 entries, to which were paid $2,381.50 at London in 1881, 2,571 at

Hamilton in 1880, 2,402 at Ottawa in 1879, 3,110 at Toronto in 1878, showing a continued falling off in this department.

For further particulars in regard to the competition in each class as compared with former exhibitions, I beg to refer to a table subjoined, showing the amount offered in prizes, the amount awarded, and the number of entries in each class in each of the four preceding years.

At the annual meeting the delegates by a unanimous vote, wished the continuation of the Provincial, and although the weather was fearful (raining every day) and the gate receipts small, our Council think that the exhibition has produced a great deal of good by being held in Kingston to the farmers in the eastern section of the Province.

In answer to a circular sent to the exhibitors of live stock by the Secretary, after the Kingston Exhibition, asking if any sales had been made during the fair or since by the cattle having been there, the following list has been compiled, and considering the fearful weather, has been very satisfactory :—

Horses of all kinds, 29 : of cattle, 6 Shorthorns, 1 Devon, 13 Ayrshires, 7 Galloways, 4 Jerseys, 31 in all. Sheep—6 Cotswolds, 22 Leicesters, 16 Lincolns, 52 Southdowns, 12 Shropshire Downs, 19 Oxfordshire Downs, in all 127. Swine—42 Berkshires, 20 Suffolks, 8 Poland Chinas, 13 Essex and 20 Yorkshires, 103 in all. Correspondents all say had the weather been more favourable they could have sold many more, also a number more have doubtless been sold since the circular was answered ; they also mention that the prizes from the Provincial give their stock a better reputation for the American market.

We also give two notes by breeders amongst many received:—

One from Mr. Wm. Whitelaw, of Guelph, says : "I think by all means we should have a Provincial Exhibition, and from the fact that there is a general feeling among the farmers, that a show should be held yearly under the management of the Agricultural and Arts Association."

Another from Mr. J. C. Snell, of Edmonton, who says : "I am decidedly in favour of continuing the Provincial Fair as it is the only large exhibition we have in whose management the farmers are represented. I consider a prize or medal given by the Provincial Agricultural Association of far greater value, as an advertisement, than one given by any local Association.

"I have attended every Provincial Exhibition since 1856, and have been an exhibitor at all, but true I am firmly of the opinion that an institution so intimately linked with the Agricultural History of our Province, and one which has been the means of educating our people up to the advantages of improved methods of farming, and improved breeds of stock should not be allowed to fail at this critical period.

"I believe the farmers will stand by their Provincial Exhibition, and it would be a serious loss to the community were a year to pass without holding an exhibition.

"The show at Kingston was a grand one, and the fact that the bad weather hurt it financially, should not be charged to the Association or its management ; such a week of wet weather would have shaken one of the local fairs even more seriously. Let the show be held in the west next year, and I have not the slightest doubt it will be a grand success."

Financial Results.

The total amount received for members' fees, rent of booths, stables, poultry, prize grants and admission fees, as near as I can make it out was $9,026, against $20,029.26 in 1881, $13,960 in 1880, $11,056 in 1879, and $23,478 in 1878.

I have the honour to be, Sir,

Your obedient servant,

Henry Wade, *Secretary.*

RESULTS of the Exhibition of 1882, showing the Amount offered in Prizes, the Amount Awarded, and the Number of Entries in 1882, 1881, 1880, 1879, and 1878.

CLASSES.	Amount offered, 1881.	Amount awarded, 1881.	Number of Entries, 1882. Kingston.	Number of Entries, 1881. London.	Number of Entries, 1880. Hamilton.	Number of Entries, 1879. Ottawa.	Number of Entries, 1878. Toronto.
	$ c.	$ c,					
Thoroughbred Horses	277 00	30 00	6	46	50	39	51
Roadster Horses	360 00	289 00	76	200	196	123	194
Carriage Horses	398 00	338 00	142	245	221	149	241
Agricultural Horses	351 00	264 00	59	149	148	122	215
Clydesdale Heavy Draught Horses	366 00	190 00	40	109	90	59	115
Suffolk Heavy Draught Horses	84 00	30 00	4				
Percheron Heavy Draught Horses	84 00	70 00	21				
Durham Cattle	665 50	625 50	137	174	134	102	283
Hereford Cattle	330 00	330 00	76	62	46	33	27
Devon Cattle	330 00	250 00	56	73	42	51	45
Ayrshire Cattle	518 00	438 00	90	104	103	194	129
Galloway Cattle	325 00	255 00	43	34	37	54	47
Jersey, or Alderney Cattle	134 00	134 00	59	51	23	61	27
Angus, or Polled Aberdeen Cattle	245 00	197 00	27	6			
Holstein Cattle	35 00						
Grade Cattle	245 00	240 00	52	90	29	62	63
Fat and Working Cattle	335 00	283 00	40	62	46	61	66
Dominion Special Prize (for Cow of any breed for milking purposes)	60 00	60 00	11				
Prince of Wales' Annual Prize (Special)	60 00	60 00	2				
Farmers' Advocate Prize (Special)	100 00	100 00	4				
Extra Animals		10 00	23				
Cotswold Sheep	258 00	244 00	49	153	155	55	244
Leicester Sheep	266 00	266 00	75	184	204	137	184
Lincoln Sheep	244 06	244 00	53	143	94	54	85
Southdown Sheep	244 00	244 00	80	107	136	105	107
Shropshire and Hampshire Down Sheep	158 00	158 00	45	55	60	44	15
Merino Sheep	66 00	59 00	32	26			
Fat Sheep	72 00	64 00	20	36	26	36	24
Improved Berkshire Pigs	230 00	230 00	93	126	131	123	214
Suffolk Pigs	228 00	228 00	115	105	141	90	147
Poland China Pigs	190 00	170 00	18	57			
Essex Pigs	190 00	190 00	50	50	76	35	42
Yorkshire and other large Breed Pigs	228 00	213 00	67	48	59	107	68
Poultry	264 00	234 00	226	319	417	284	396
Chickens and Ducks, 1882	159 00	111 00	162	313	404	176	425
Agricultural Implements and Machines—for Exhibition only			96	160	141	121	185

Agricultural Implements	313 00	113 00	69	195	152	233			266
Carriages and Sleighs, and parts thereof	298 00	259 00	196	160	150	113			158
Agricultural Tools and Implements (hand use)	188 00	15 00	16	100	77	116			137
Field Grains, Hops, etc.	477 00	429 00	324	319	381	506			319
Small Field Seeds, Flax, etc	197 00	121 00	90	85	113	185			80
Field Roots, Hoed Crops, etc.	235 00	175 00	300	416	452	400			314
Dairy Produce	749 00	684 00	155	172	297	276			86
Sugar, Bacon, etc.	63 00	16 00	10	44	45	78			67
Honey and Apiary Supplies	40 00	31 00	21						
Domestic Wines	92 00	62 00	33	42	62	47			50
Fruit (Professional List)	207 00	146 00	35	61	80	76			101
Fruit (General List), Apples and Pears	384 00	350 00	1306	1283	1985	843			1792
Fruit (General List), Plums, Peaches, Grapes, etc.	503 00	331 00	437	432	943	550			604
Garden Vegetables	184 00	173 50	436	543	611	475			433
Plants and Flowers	362 50	206 50	138	312	380	308			293
Fine Arts (Oil Paintings)	255 00	192 00	131	185	191	162			181
Fine Arts (Water Colours, Crayon, Pencil, etc.)	272 00	124 00	237	288	361	319			354
Fine Arts (Penmanship, Photography, etc.)	234 00	91 00	30	69	75	119			141
Natural History and Mineralogy	274 00	107 00	40	45	54	86			29
Ladies' Work (Ornamental)	220 00	199 50	512	311	443	628			372
Ladies' Work (useful)	139 50	111 00	285	261	216	416			369
Chemical Manufactures and Preparations, etc.	92 00	4 00	12	36	39	78			87
Printing, Bookbinding, Paper, etc.				20	33	28			68
Musical Instruments (Exhibition only)			30	45	19	6			48
Building Materials, Painting, and Works in Marble, etc	204 00	31 00	15	33	50	61			88
Cabinet Ware and other Wood and Hair Manufactures	297 00	86 00	86	84	86	100			168
Machinery, and parts thereof and Tools	835 50	80 00	50	97	135	194			422
Sewing Machines (for Exhibition only)			15	31	48	24			45
Mechanical Metal Work (Miscellaneous)	316 00	44 00	50	66	73	92			
Stoves and Castings	166 00	92 00	50	89	159	152			268
Saddle, Harness, and Trunk-makers Work, etc	200 00	86 00	30	26	50	54			45
Boot and Shoemakers' Work and Materials	179 00	86 00	32	32	41	72			59
Wearing Apparel and Furs, etc	245 00	130 00	75	36	71	76			46
Woollen Goods	306 00	104 00	95	103	139	190			63
Groceries and Provisions	195 00	79 00	55	66	72	128			100
Essays	100 00	100 00	9	11					
Manitoba Exhibit	1000 00	1000 00	321						
Medals (for Exhibition)	1890 00	2090 00							
Medals (for Prize Farms)	115 00	115 00	21						
Totals	19,927 00	14,912 00	7916	9486	11,252	9668			11,292

COMPARATIVE TABLE, showing the progress of the Provincial Exhibition since its commencement in 1846.

Year.	PLACE OF EXHIBITION.	Total amount offered in Prizes.	Total number of entries.	Total amount awarded.
		$ c.		$ c.
1846	Toronto	1600 00	1150	1100 00
1847	Hamilton	3000 00	1600	2400 00
1848	Cobourg	3100 00	1500	2[illegible]00 00
1849	Kingston	5600 00	1429	2800 00
1850	Niagara	6106 00	1638	3400 00
1851	Brockville	5017 85	1466	3223 75
1852	Toronto	5916 95	3048	4913 00
1853	Hamilton	6410 15	2820	5293 25
1854	London	7176 10	2933	5427 50
1855	Cobourg	9216 30	3077	6941 70
1856	Kingston	9238 00	3791	6799 50
1857	Brantford	10071 40	4337	8136 00
1858	Toronto	10700 50	5572	9215 00
1859	Kingston	10513 00	4830	8067 50
1860	Hamilton	15015 50	7532	12900 00
1861	London	12031 00	6242	10188 00
1862	Toronto	12236 00	6319	10722 00
1863	Kingston	11866 00	4756	9166 00
1864	Hamilton	12559 50	6392	10304 25
1865	London	13434 00	7221	11036 75
1866	Toronto	12712 00	6279	10288 50
1867	Kingston	12731 00	4825	9311 50
1868	Hamilton	13304 50	6620	11120 00
1869	London	13428 00	7649	11459 50
1870	Toronto	14110 00	6847	12441 70
1871	Kingston	15724 50	6682	12951 00
1872	Hamilton	16092 00	7714	13142 00
1873	London	16016 00	8420	13797 00
1874	Toronto	16640 00	8162	14070 00
1875	Ottawa	16996 50	7318	14651 00
1876	Hamilton	18237 00	10011	15631 50
1877	London	16320 60	10618	14387 00
1878	Toronto	17947 40	10292	13980 00
1879	Ottawa	18525 00	9668	14957 50
1880	Hamilton	16994 00	11252	13147 50
1881	London	17154 50	9486	13456 50
1882	Kingston	19927 00	7916	14912 00

THE HERDS AND FLOCKS OF ONTARIO.

To the President and Members of the Council of the Agricultural and Arts Association of Ontario.

Gentlemen—In July last I had the honor of a communication from Mr. Drury asking if I would undertake to act as Live Stock Reporter to your Association. I took the offer as a high compliment to our College and an honour to myself, and accordingly agreed to report upon the cattle and sheep shown at the Exhibition held at Kingston in September last. In addition to these, it was suggested that I should also undertake a description of the breeds of horses ; but, having doubts of my own exact knowledge—at least such a knowledge as should alone be presented to our Province—I declined their representation meantime, and would rather do better if possible to a smaller area in one year.

I proceeded to Kingston, and was occupied four days in examining, criticising, comparing, and in every sense judging the several breeds of cattle and sheep then present. I did so alone, asking nobody's opinion—not even that of the owners—and thus what is advanced in these pages is chargeable for or against myself alone. I am prepared for any form of criticism as, occupying the position I do, I am untied to any breed or influence, and can give opinion fearlessly. I took no note of the decision of the regular judges, and had no communication with them whatsoever. I understood my work to be an independent report upon the characteristics and standing of what I found within your grounds on that occasion.

Shortly after receipt of this commission, and on taking in the bearings of the whole subject, it occurred to me that much greater interest and value would accompany my report were it, in some respects, made applicable to the whole Province. Your exhibition cannot possibly represent all sections, though possibly all the breeds, and in order therefore to give the work a truly Provincial ring, I obtained from Mr. Wade, your secretary, the names and addresses of over one thousand eight hundred breeders of cattle and sheep —obtained by him, I have no doubt, from the oldest as well as the most recent reliable records. I wished to know as exactly as possible the number of herds and flocks in our Province, when they were established, in what manner they were established or rather from whom each received its start, thus checking its genuineness as regards purity of source, for many would give a return as possessing so many head of, say, Cotswold Sheep and Shorthorn Cattle without reference to pure breeding ; indeed not a few of those received by me have not given this required reference, and consequently cannot get a place in this report. Still further to obtain the greatest possible exactness on the important point of breeders of pure breeds of cattle, I required the registered name and number of the bull in use with each of the herds ; the same could not so well apply to sheep, but the breeder of the stock ram then in use for the flock, having been received, should help us to check purity.

In this manner I think we have obtained material of a valuable character, such as, if properly handled, should stand of some national reference in future, when, let us say, the political economist of the year 1900 will compare and build upon past history. I cannot take the blame for any omissions, and I have no doubt some exist.

I shall handle the whole subject under the following heads :

A.—The Herds of Ontario.

I.—Breeds :

1. Their localities and numbers.
2. Their origin and present standing.

II.—The Characteristics of Breeds.

B.—The Flocks of Ontario.

I.—Breeds: localities, numbers, origin and present standing.
II.—The Characteristics of Breeds.
III.—Herds and Flocks unrepresented at Kingston.

C.—Present Position of Ontario in regard to thoroughbred Cattle and Sheep.

A.—The Herds of Ontario.

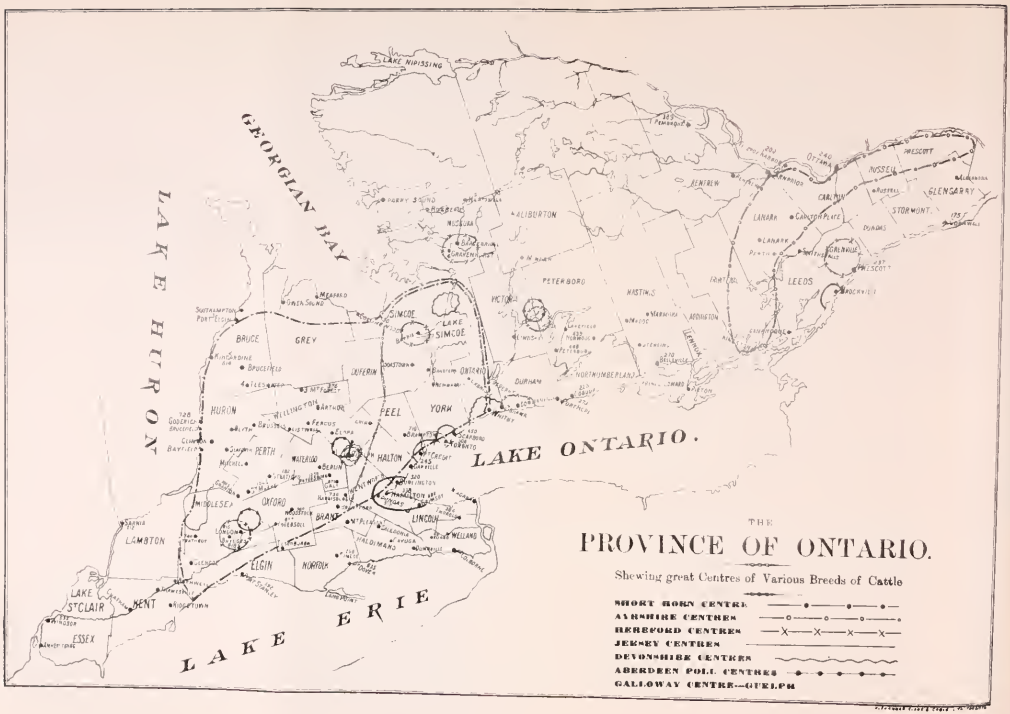
A Herd, by the practice of most Agricultural Societies, consists of one male and five females. My first pleasant duty is to congratulate the Province on the average number of animals in her herds; there are as many as 350 herds of pure bred cattle of all classes in all her area, and the average number in each herd is $10\frac{1}{3}$ cows or cow kind, and exactly three bulls. The first idea here may be a disappointing one as regards the number of herds—only 350 in such a Province as Ontario, with all her age comparatively, her wealth and enterprise? True, we say, and very creditable also, because other countries—according to age and wealth—cannot equal such an exhibit. England, with all her age and gold, is said to possess but 500 breeders of thoroughbred cattle, but no doubt the average number per herd there must be much larger than here. I am prepared to show that were all our farmers up to time in the live stock interest and took advantage of the sources of purity at their own doors, there is material enough to make Ontario what she is not at present—a grower of flesh as much as she ought to be, as well as a grower of grain. The very fact of numbers per herd is evidence of centralization, of non-distribution, and of grain-growing more than beef. I consider ten pure-bred females a very large average over seven different breeds of cattle; it means that some have fifty and more, and in this item I do not take advantage of the unusual Bow Park circumstance. Our breeders, therefore, are evidently such in *profession*, more than possessing only one bull and one cow to keep up their own thorough-breds solely for their own use. In one sense they are ahead of their day: they are practically waiting until their neighbors feel their places, their duty, as well as their self-interest. Ontario, then, has no cause to blush for meagre herds or in numbers per herd.

I.—Breeds of Cattle in Ontario.

It would be an interesting enquiry to make out what led to the choice of particular breeds of cattle on the part of certain individuals in our Province. In all countries cattle have preceded horses in helping man to make a living, to reclaim land and to cultivate. Ontario was no exception in this, and is now as much so as ever. Shall we say, then, that Englishmen as such, not Scotchmen or Irishmen so much, brought with them the old knowledge of Devon cattle as superior workers, and acted upon such facts? It is true that Devon history goes far back in Ontario breeding, both as direct importations and as purchases from the United States; the want of oxen in clearing the forest had to be largely supplied from our neighbors who, fifty years ago, were older than we are now.

Possibly the second idea on the part of our pioneers was a household want—the necessity for milk in all its value—and thus, in addition to labor, the particular breed would be chosen for this purpose. Why not the Devon here also? Then, again, the great lumbering interest would call for working cattle, a market which the settler would attend to through a particular breed, and the Devon more than any other would get a preference.

But, in addition to these influences, it is clear that choice of breed has been very much a matter "*bred in the bone.*" Why is it that Jardines from Ayrshire, Scotland, are breeders of Ayrshire cattle; that McCraes from Galloway, Scotland, are eminent here as breeders of the south of Scotland Polls of that name; that the Rudds from the south of England still lead the Province in Devon breeding; that the Stones from Gloucester, England, still bow to no one in value of Shorthorn and Hereford cattle; and, to be more modern, why is it, as a rule, that Scotchmen won't look at Jerseys, nor


LAKE NIPISSING
GEORGIAN BAY
LAKE HURON
LAKE SIMCOE
LAKE ONTARIO.
LAKE ERIE
LAKE ST CLAIR
PETERBORO
LEEDS
GLENGARRY
PRESCOTT
RUSSELL
STORMONT
CARLETON
LANARK
RENFREW
HASTINGS
PETERBORO
VICTORIA
ALIBURTON
NIPISSING
PARRY SOUND
MUSKOKA
SIMCOE
GREY
BRUCE
HURON
PERTH
WATERLOO
WELLINGTON
DUFFERIN
ONTARIO
DURHAM
NORTHUMBERLAND
PEEL
YORK
HALTON
WENTWORTH
LINCOLN
HAMILTON
BRANT
OXFORD
NORFOLK
HALDIMAND
WELLAND
LINCOLN
MIDDLESEX
LAMBTON
ELGIN
KENT
ESSEX
WINDSOR
SARNIA
CHATHAM
LONDON
STRATFORD
GODERICH
OWEN SOUND
MEAFORD
BARRIE
ORILLIA
COLLINGWOOD
BRUCEFIELD
MITCHELL
CLINTON
GODERICH
SEAFORTH
EXETER
GODERICH
BAYFIELD
CLIFFORD
PALMERSTON
LISTOWEL
MILVERTON
ELORA
FERGUS
GUELPH
ACTON
GEORGETOWN
BRAMPTON
MILTON
OAKVILLE
BURLINGTON
DUNDAS
HAMILTON
ST CATHARINES
NIAGARA
WELLAND
PORT COLBORNE
FORT ERIE
BRANTFORD
PARIS
SIMCOE
TILLSONBURG
DELHI
PORT DOVER
PORT STANLEY
ST THOMAS
AYLMER
TILBURY
WALLACEBURG
CHATHAM
WINDSOR
SARNIA
PETROLIA
WYOMING
FORT ERIE
NIAGARA FALLS
WELLAND
PORT COLBORNE
DUNNVILLE
CAYUGA
HAGERSVILLE
SIMCOE
TILLSONBURG
INGERSOLL
WOODSTOCK
TAVISTOCK
NEW HAMBURG
BERLIN
PRESTON
GALT
HESPELER
ELMIRA
ST JACOBS
WATERLOO
KITCHENER

Englishmen at Aberdeen Polls? Naturally, then, men follow very much as they are taught, according to what they know—not always even according to self-interest.

Practically, however, since the year 1876, men have imported and bred to meet the growing demand for four things: (1) Cattle to fatten in Ontario conditions—stall feeding; (2) Cows to make the dairy in Ontario; (3) Cows to suit wealthy private families and creameries; and (4) Cattle to fill the American and Canadian demand for extensive ranch grazing. Thus, then, we find the following classification:

1.—Ontario Stall Feeding	Shorthorns.
2.—Ontario Dairy	Ayrshire and Shorthorn.
3.—Ontario Creameries and families of wealth	Jerseys.
4.—American and Canadian Ranch Grazing	Hereford, Aberdeen Poll, and Galloway.

1. The Localities and Numbers of Pure-Bred Cattle in Ontario.

No truer guide to the enterprise of a country can be used than existing evidence of what in any profession is the acknowledged line of wealth. In this, legitimate speculation is necessarily a part, as it is always a part of vigorous enterprise; but irrespective of any such motive, and keeping to the steady tenor of agricultural progress, it should be to every Canadian a most interesting subject to study the existing centres of breeds of live stock, what have regulated such localization and what retards the spread of the circles.

As a help to such a sketch, I beg to submit a skeleton map of the Province, showing counties, cities, towns and principal villages, and well-known parts, whereon I have outlined four breeds of cattle according to what is statistically known as "great centres,"—that is, the coming and going of an enclosing ring as regulated by numbers from a given centre, that centre being also established by a given average obtained from the actual figures sent to the compiler. This is now my subject with cattle.

The Shorthorns—I wish people would go back to the fine old name, Durham—in Ontario are nine-tenths of all the pure-bred bulls, and six-sevenths of all the pure-bred cows; their great centre is a point near Elora, in the county of Wellington, from which the radiation is comparatively regular—very uniform indeed when compared with the isolation of other breeds of cattle. Starting from Hamilton as the nearest point on the southern boundary of the Shorthorns, the lake shore is followed eastwards to Whitby in the county of Ontario; from that the line takes a northeasterly direction through Ontario county and embracing the most of it, striking Victoria county at Woodville, running along the boundary line between these counties, partly into the township of Mara, thence to Orillia and Tay into the village of Stayner. This is the only part of the Georgian Bay touched by our Shorthorn circle, as from Stayner it strikes westwards, bending slightly southwards through the counties of Grey and Bruce to Southampton; from Southampton the shore of Lake Huron is followed all the way to Lambton; thence between Middlesex and Lambton to the shore of Lake Erie; from this latter point an almost straight line is maintained eastwards through the counties of Elgin, Oxford, Brant and Wentworth to Hamilton.

This is the present warm ground of the Shorthorn—all outside this boundary is weak in the same thing; not that there are not several herds, and good ones, but numbers are so few as to be unable to draw the line aside from the stronger average of others. Take an example or two: The counties of Essex, Kent and Lambton are outside of this circle because Kent is particularly a non-Shorthorn section, as it is, by-the-way, in any other class of cattle; but Lambton and Essex stand fairly well on the average, and would be entitled to representation were Middlesex not so strong. Middlesex is so strong that but a slight divergence of the boundary is allowed into Lambton, and Essex is, by its position, cut off by Kent. Then, again, take a southern example of weakness in Shorthorns as represented by the counties of Welland, Simcoe, part Wentworth, Haldimand, part Brant, Norfolk, part Oxford and part Elgin. Neither Elgin, Lincoln, Norfolk nor Welland are up to the average—are very weak, indeed—and thus pull down the standing of all that district of country, which, but for Brant, Wentworth and Oxford, would be still more

conspicuous in its isolation. In this I must except Haldimand to some extent, for it, of itself, stands well.

In this manner much more could be said of Shorthorn centralization, but the map will guide the enquirer better than any elaborate description. Is it not a sad blot on our escutcheon that the greatest beefing cattle of the world are practically unrepresented east of the county of Ontario? No fewer than fifteen of these counties cannot ask for even a passing notice, but a good deal could be said of Durham, Northumberland and Victoria, as taken together they would equal York county in this regard, though not sufficiently strong to draw the line east of Ontario.

The great central district of Shorthorns is Wellington, second is Brant which may thank the Bow Park Herd, third is Middlesex, fourth Waterloo, fifth Ontario, sixth Perth, seventh York, eighth Oxford, ninth Bothwell, tenth Simcoe, eleventh Huron, and Bruce twelfth in order of merit by numbers.

Another point demanding notice in such a public report as this, is the relative influence, apparently, of certain herds upon the cattle of the neighborhood. One or two marked examples only: How is it that no fewer than five counties immediately south of the finest herd of Shorthorns on the American Continent are practically non-patronizers of the breed? It must be want of interest in the special line, because, taking it for granted that Bow Park prices are on an average too much for the average farmer, the other sources—and cheaper—are not too far off for them; neither can it be explained for want of time, as Mr. William Douglass, of Caledonia, began as a breeder of Shorthorns in 1855. If the county of York be taken as a centre for distribution and influence, what is the matter with Peel? Low-lying, heavy land is just as suitable for Shorthorns as any other breed, under proper management, and grain-growing is very intimately associated with their history in all countries.

In order of numbers we notice next the Ayrshires. There are two prominent districts of these in Ontario. That having York County as a centre, and embracing part of Ontario, Simcoe, Peel, Halton, and Wentworth; and the second including parts of Frontenac, Lanark, Carleton, Russell, and Prescott. This division into two centres is regulated by Wentworth and Ontario Counties on the one hand, and by Lanark and Carleton on the other. Outside of either of these rings, no other county can talk Ayrshire excepting to some extent, Oxford and Northumberland, but certainly no where else, and this is somewhat remarkable for the western part of the Province where dairying is so prominent. One hundred bulls and three hundred cows limits this breed all over.

The Herefords are represented in eight counties, and, we may safely say nowhere else. Wellington holds one-half of the whole, Cornwall is second, Simcoe third, Muskoka next, then Middlesex, Victoria, Ontario, and Brant in order of numbers. Seventy bulls and two hundred cows in all.

The Devon is limited to six counties, and about twenty bulls and forty cows. The counties of Simcoe, Ontario and Wellington, with a touch in York, Grey, and Elgin.

The Aberdeen Polls, by a recent fever, are somewhat ahead of the Galloways in number. They are to be found in Middlesex, Wellington, and Victoria.

The Galloways, so far as I can ascertain, are yet confined to Wellington—having an advocate there of undaunted pluck, and who is now receiving a corresponding reward.

The Jerseys are scattering, and are found in the counties of Wentworth, Lincoln, Peel, Wellington, with a few in Hastings and Halton.

2. The Origin and Present Standing of Cattle in Ontario.

In a duty of this kind, it is one of the difficulties to trace most things to their beginnings, and as it is best to submit to no speculations but hold to actual facts, I shall simply record what has been sent me from various breeders.

The five oldest herds of Shorthorns in Ontario are:

F. W. Stone, Wellington County 1853
John Snell & Sons, Peel County 1854
James J. Wright, Wellington County 1854

James Cowan, Waterloo County 1855
Wm. Douglass, Brant County 1855

Just thirty years ago, when even the present older townships were seventy per cent. bush, roads of a very scratchy character, lake navigation somewhat primitive, and any trade with the United States of a corresponding irregularity, the idea of importing valuable cattle from England could have been held only by the more bold and enterprising—such as F. W. Stone, of Guelph. His imagination must have seen Ontario of 1882, in order to back up his present herds. I have no authority from him, nor any other, for saying that at the lowest computation his Shorthorn and Hereford interest cannot be less than $100,000. He began importing Shorthorns in 1853, and Herefords in 1860. I cannot leave this brief notice of one of our oldest herds, without the remark that during all the years from 1860 to 1875, Mr. Stone was actually laughed at by very many because of his madness in having anything to do with Herefords: Who laughs now?

The Messrs. Snell began with purchases from Thos. Blanchard, of Malton, and Ralph Wade, of Port Hope, and while giving more attention now than formerly, to sheep and swine, they still hold several good cows and the newly imported bull, "Waterloo Warder" [696 reg. 7 vol.], as bred by Lord Polworth, Scotland.

Mr. Wright established his herd from that of H. Parsons, of Guelph, and has now in use "Senator" [7837]—bred at the Ontario Experimental Farm.

The Clochmhor herd of James Cowan and Sons, has an interesting history. Their first purchase was Red Rose 10th from Stevens & Sherwood, New York, giving $160 for what had cost $600 when a suckling calf—a rare figure in those days. Mr. Cowan sold three of her offspring to J. L. Harrison, of New York, for $1,000, who in turn disposed of them to an English purchaser for $6,000, and afterwards exported another for $800. He even declined the handsome sum of $5,500 for a cow and calf of the same blood. Mr. Cowan also added to his herd from those of Mr. Wingfield, Guelph, and the Hon. W. A. Ferguson. In 1861 an important addition was made, by joint ownership with the Hon. D. Christie, by the purchase of "Oxford Lad" [578] 5056, from J. O. Shelden, New York, at a cost of $1,000, which gave the herd a high standing for symmetry and constitution. Thus invigorated, the Clochmhor herd has had Bates blood in all subsequent use. Its present lord is the 6th Earl of Antrim, 38674, and last year there was added some thirteen head of females from the extensive herd or F. W. Stone, Wellington, consisting, among other families, of Sanspariel and Pollyanthus.

Mr. Wm. Douglass, Brant County, made a beginning from the Hon. A. Ferguson, in 1855, and subsequently made use of bulls from the Hon. M. H. Cochrane, Quebec. His present stock bull is Earl of Goodness 5th, 32519, from the Bow Park Herd.

Halton County, as represented by Mr. R. B. Ireland's herd, goes back to 1855 also, where "Mazurka Duke" [5703] 16523, is now in use.

Ontario County dates back to 1857, when Mr. J. S. Thomson imported from Mr. Douglass (Athelstone?) Scotland. His present bull is Scarlet Velvet, [7833].

Mr. Jonathan Davis, Wentworth, is still a breeder of Shorthorns on a small scale having begun in 1858.

Lincoln County has a few old herds, among which is that of Mr. Wm. Ash, St. Catharines, starting in 1858, and from the herd of Mr. John Baker, Macedon, New York. The present bull of this herd is "Model Hero," [7481] bred at the Ontario Experimental Farm.

These, going back in our history a quarter of a century, may be taken as our older types of herds now rarely competing at our larger exhibitions, and but one of them—that of the Messrs. Snell—showing at Kingston.

It will be well now to take up the systematic notice of those herds that were represented at your Kingston Exhibition this year, and in doing this we shall follow the counties according to their standing by numbers of thoroughbred cattle.

Wellington.—F. W. Stone, has a Shorthorn herd of about 120 head, but none were shown. He has also a herd of 130 Herefords, of which eighteen head were on the ground This representation of one of the oldest and largest Hereford herds on the Continent was headed by the aged, but grandly even bull Regent (5532), got by Governor 4th, an

importation from England. Regent is remarkable for length of hind quarters, great substance and a general evenness,—no coarseness anywhere. Were we very critical, a somewhat flat rib would form but a very small item in such a fine field—not overfed either. A young bull, Victor 5th (6246)—out of Vesta 9th, by Duke of Manchester—is not equal in the crops to his sire, has a rather effeminate head for a Hereford, but a perfect loin and all the fulness of the breed in the hind quarters. Vesta 9th, herself, a five-year-old, out of Vesta 7th, by Governor 4th, is simply a perfect animal of her class, with a leaning on the small side. What a splendid loin, and depth of frame without coarseness!

Messrs. J. & W. Watt exhibited fifteen head of Shorthorns out of their herd of sixty-two. "Barmpton Hero" [6595], four-year-old, bred by J. Dryden, of Brooklin, from Sittyton blood, weighs 2,500 lbs. This bull is but in good fair flesh, has an Aberdeen skin—neither thick nor thin—a grand, intelligent head; looks rather light in flank, which is but partly true, for his immense forward depth would require something unnatural to correspond, there is just a cut of a "Hereford ham" in this almost faultless animal. Rosalie, out of Rose 2nd has all the appearance of making a typical mother. "Matchless," of Kinellar 2nd, from Campbell, of Kinellar, Aberdeenshire, is an unusually heavy cow, with calf at foot—milk that would keep twins, and in her build has just as much a milking type as an Ayrshire.

Messrs. J. & R. McQueen from a herd of forty-one head, exhibit "Duke of Athol" [4962], a five-year-old, bred by W. Douglass, of Caledonia; this, by the way, is a descendant of the $46,000 cow of New York Mills fame. He is not in high flesh—2,350 pounds—has great length of frame, fine even loins, rather flat on the shoulder, and narrow at tail, but has great length of rump, and depth of fore-quarters.

Thos. McCrae had forty-one head on the ground—thirty-five Galloways and six Aberdeen Poll-cows—all recently imported. Among the Galloways is a yearling bull, "Macleod 2nd of Drumlanrig" [553] (1676), bred by the Duke of Buccleugh. Here we do not find the rough characteristic head of the breed, age being allowed for, and the bone is even on the fine side; there is a deep chest, grand hair, and just the right kind of quality by handling—a mellowness under a thickish skin. The deep flank, grand shoulder and arm, with full short neck make up an unusually good Galloway bull—marred only by a slight droop of the hind-quarters, that will improve with age. "Beauty 2nd of Troquhain" [536] (3517), four-year-old, and a Medallist, is not, to my thinking, a typical Galloway, because too fine all over, though large and strong. Altogether this herd is the best ever shown in Canada—not possessing a single cull. Mr. McCrae's Aberdeen Polls, as a class, are, all over, not so good as his Galloways—good unquestionably, but the Galloways are hard to beat. The cow "Ariadine 7th" (4915), bred by James Scott, of Easter Tulloch, Aberdeen, taken as a fair stamp of the herd, has plenty length, but too bold headed, and wants width according to her length.

Hemlock Young showed a four-year-old fat heifer, weighing 1,950 pounds by estimate; the fine head, and bone with fully two-thirds "blood" makes her a very fine stamp of the Western Ontario beefer.

Ontario.—Messrs. T. Guy & Son, whose herd history dates from 1865, had no fewer than twenty-three head of Ayrshires on exhibition. "William Wallace" [19 reg. 2 vol.], as head of the herd, three-year-old, bred by Jardine, Hamilton, from Mars 1st, a well-known prize taker, is in good form, with no coarseness, much depth all through, and no slab-ribbing as follows many of the breed; he has the strong bone, however, that characterises. The top cow of the lot may be "Gerta 4th [1181];" a four-year-old, one month after calving. Here we have a medium length of face, clean head, very fine neck, beautiful light fore-quarters, grandly sprung ribs, with width behind, and the desirable double udder.

Waterloo.—Messrs. H. & J. Groff are breeders of Shorthorns, and fatteners of their grades. In competition now they had fifteen head of thoroughbreds, sixty grades, and nine fattening animals. These are led by "Baron of Waterloo" [6613], by "Young Aberdeen" [4512], out of "Red Rose of Waterloo," coming three years; quality on the fine side, a splendid head of the old Durham stamp, with, however, drooping hind-quarters. "Pilot 2nd," an eight months calf, takes his sire's fineness, with good fore-quarters, but deficient on ribs. A two-year-old cow, with calf at foot, has an extraordinary width of hind-

quarters, and, to some judges, is too fine in skin—a rare fault others will say, and may be one of the reasons of the Groff success in early maturing when fattening. A three-year-old, red cow, cannot be met on the ground for length of hind-quarters; a heifer calf out of "Lady Graceful 2nd," by "Knight of Warlaby" [5501], is a very massive five months on milk, and takes great width behind.

In beefers the Messrs. Groff have several magnificent specimens—magnificent is not too strong. Choose first a yearling steer, a year-old in December 1881, weighing 1,450 pounds, from "Knight of Warlaby" [5501] of steer-getting fame; the hair, the grand silky mossy coat of hair, so indicative always of quality—the handling everywhere—loin included, and the round barrel, lacking, however, in width behind, all go to bespeak a coming prize taker. Take next a lot of four two-year-old fat steers, averaging 1,900 pounds, (April calves); note the great girths, the covering of loin and barrel, and yet after all a deficient hind-quarter in two cases, both above and below. Then again examine two three-year-old steers, the second cross of Booth blood—upon grade cows—that average 2,350 pounds. In these we naturally look for the weakness, the grandeur being so conspicuous. Shall we speak of standing too high behind, of narrow thighs, of a cow head, and dog hocks? true in a measure, but yet measurable and makes the great points stronger.

Victoria.—Mr. M. Boyd, Bobcaygeon, had five Herefords and nine Aberdeen Polls on exhibition. His Hereford bull "Bonnie Lad 2nd," by "Duke of Manchester," from the Ontario Experimental Farm, is a very even animal of good quality, and lengthy; but wants length in hind quarters, and holds a rather effeminate head. The three-year-old cow from Mr. Stone's herd has the great length of hind quarters, with corresponding width, that belong to the breed; here also is that "depth without height" which is liked in her kind—a good chunky cow. The two-year-old heifer from the same stock falls off in this kind of quarter.

The Aberdeen Poll exhibit is headed by "Black Prince of Ambleside;" this bull is in low condition, and disappointed those unacquainted with the breed. He is lengthy, and takes flank and thigh down well, though rather high in the tail. "Princess Dagmar" is a four-year-old cow, carrying a grand head, has depth of shoulder, length of barrel, plenty of depth also behind, and unusually wide there, with all the quality of a first-class Shorthorn. At the same time this cow is deficient in ribs and crops, and short in rumps. The four-year-old cow "Caroline" has strength tending to coarseness, though not coarse actually, an irregular head, length and width of hind-quarters; altogether a fine frame, spoiled by a curious head. "Dominion Girl" is a yearling, characterised by a strong tail, fine length of body, and otherwise has the appearance of a future prize taker. "Pauline" is a leggy five-year-old, with the fore-quarters of a milker, and plenty of substance behind. "Coquette 10th" (4663), two-year-old, bred by Sir Geo. McPherson Grant, and recently bought from Mr. Whitfield, Quebec, is of the valuable family of her name from Ballindolloch, Scotland. A heifer of grand quality all over—bone, skin, hair, and covering otherwise, with a roman nose touching on coarseness, a chunky frame—a big-little beast.

Mr. Boyd's enterprise deserves special notice. He is evidently exercising a cautious liberality in testing Shorthorns, Herefords, and Aberdeen Polls under precisely equal conditions upon an extensive back-woods grazing. The result will be interesting and important to us as a Province, and every reliance can be placed in Mr. Boyd's impartial treatment, and a faithful report will no doubt be made ere long as to such an unusual competition between the three greatest beefing breeds of the world.

Simcoe.—Another, and an older, civilizer of his country with improved stock is C. C. Bridges, of Shanty Bay, who began just ten years ago with a draft of Herefords from Mr. Stone, of Guelph. His present stock bull is "Corporal" (4175), imported, with a very fine herd of six other bulls and thirty females. This bull has a good depth of chest and plenty of thigh, but is wedgy in rumps, and slack crops; indeed his superior fore-quarters make his other parts appear to be deficient, if not really so. Mr. Bridges shows nine females, among which we notice "Miss Annie," a three-year-old, newly imported, with very fine fore-quarters; forward of the hooks this is a grand cow—superior to Mr. Stone's "Vesta 9th" there, but not nearly so good as his behind.

"Mary 3rd" is larger, longer, as good in barrel, but not so even all over as "Miss Annie"—a massive, vigorous cow.

York.—Messrs. G. and D. Wood have nine Devons here. The three-year-old bull "Marquis" is a very finished Devon of the chunky stamp, with broad loins, plenty depth of thigh, fine bone, and altogether a deep beast; he lacks, however, in width of thigh, has rather a strong tail, and too flat on shoulder for his kind. "March Rose," a six-year-old cow, has the light fore-quarters of a milker, with plenty depth, broad loins, and length of rumps, and even better shoulder than the bull.

Wentworth.—V. S. Fuller, of Hamilton, is our latest and most vigorous exponent of the Jerseys; not only so, but a fearless, practical exponent, which is more than many enthusiasts do. His herd was represented by a draft of eleven, from which note two samples: "Le Breve" (5604), a 25-months-old, newly-imported bull, of the dark stamp of these famous creamers. Though dark, he is full-colored, which now-a-days gives value; his very thin condition strains one's judgment, yet there is no fault to be found with the great length of hind-quarters, and plenty depth forward. The cow "Faith" has a nicely balanced head, great length of frame, moderate neck; but with all the surface markings indicating cream—a grand milker evidently.

P. T. Ware, of Hamilton, exhibits one Ayrshire bull-calf, "Garfield" [133], a dark-coloured, nicely-headed animal, with the characteristic slab sides and high tail of many of the breed.

John Fothergill, of Burlington, had "Prince James" [803 reg. 7 vol.], a yearling Shorthorn bull of the Messrs. Hunters' blood; good, and improves on acquaintance. His 1,700 pounds in eighteen months is away above the average in vigor, and if his prepotency be high, this is the kind of bull wanted to make and finish two-year-old steers.

W. J. Pettit, of Burlington, shows a yearling Shorthorn heifer "Belle 2nd" [902 reg. vol. 7], from the stock of McQueen, Wellington; a lengthy animal, with grand back and loins.

Leeds.—Mrs. E. M. Jones, of Brockville, and Jersey cattle fame—well merited, with pluck and good management. From a herd of twenty-five, this lady shows twelve head. "Rival" (3762, A. I. H. Book) is six years old, a whole cream-colored bull, with a black brush, great depth of barrel, good width, a very fine horn, strongly yellow, with black tips of course, medium length and fineness of tail, which is just somewhat too high. "Flora of St. Peters" and "Maggie Bradley" are cows of rare merit.

James McNeish and Son, of Lyn, exhibit six head of Ayrshires. The bull "Duke of Ardgowan" is a particularly chunky, deep, well balanced two-year-old, with lengthy hind-quarters, an unusually handsome neck, long face, and carries the hind leg of a horse in style. Much of the energy in the management of this herd is due to C. H. McNeish, one of the sons, a student of the Ontario Agricultural College, who, in addition to cattle, is well up in Berkshires.

Joseph Haig, Gananoque, shows one Shorthorn bull, "Duke of Glenallan" [1382 Reg.], a yearling of good quality, has plenty length; a growing animal not in much flesh, and stands better behind than before.

Grenville.—W. T. Benson, of Cardinal, has seventeen head of Herefords from a herd of thirty-five, and a sample of his Shorthorn herd in "Grenville Duchess 3rd," by "Prince Albert" 28336, a two-year-old heifer, with a grand frame, spoiled by head and horn. Among the Herefords are: "Bloomer 2nd," four-year-old, very good forward of hooks, with fine length and depth of fore-quarters, and a thoroughly characteristic Hereford head. On the plan of finding fault with everything if possible, we would like to see more width behind. "Rambler 6th" (6630), out of "Rosebud 5th," by "Chieftain" (4427), has a good head and fore-quarters, with depth, without filling of hind-quarters. There is a pair of extra good three-year-old cows—one particularly nice. A marked feature of Mr. Benson's Herefords is their grand Hereford heads—one of our best indications of character in these days. For example there is nothing on exhibition equal to the head of "Ajax," a yearling bull; this animal was sired by 6781. The show cow of the herd is, perhaps, "Miss Greve 4th," now eight years old—out of "Miss Greve," by "Renown" (2719). Look at the head here also, the fore-quarters of a milker, plenty length, good quality, with dog hocks however, and a slight droop of hind-quarters.

Northumberland.—W. Courtice, of Darlington, took to Devons by importing in 1857. He has nine head on exhibition. "Plumb," as a six-year-old cow, is an unusually large Devon, with long hind-quarters, well filled in rumps, great length, with a somewhat steery head and horn, but yet a fine head; the covering of the loin and handling are excellent, but we don't want her high tail, and don't expect the breed to be better in depth behind, which this one also lacks. "John A," a bull, two years old, out of "Plumb," by "Jack's Alive," is from the stock of G. Rudd, Guelph.

Frontenac.—David Nicol, of Cataraque, is a breeder of Ayrshire cattle, South Down sheep, Berkshire swine, and several kinds of poultry. From a herd of twenty-four, he shows twelve. The first thing that strikes the eye in this representative selection is no attempt at effect, and no pampering for exhibition—everything put up naturally—a practice much desired in these days of keen competition. The bull "Stonewall" is a dark red, with a vigorous look, fine head, and without being high fed is somewhat lanky. A great Ayrshire cow all over is "Moss," seven years old, out of "Effie Dean," by "Parker," by "Highland Chief," and tracing back to "Rob Roy" and "Sir Samuel" of Scotch milking fame; she is also thin from grass, and would please believers in escutcheon—which is very broad and full.

Allan Bond, of Inverary, exhibits in Shorthorns "Lord Dufferin" [8841] and "Rose Dale," the latter a pure white, and of very fine quality, with compactness.

Hastings.—H. B. Rathbun and Son, of Deseronto, are breeders of Shorthorns and Jerseys, and showed one and three of each respectively. The Shorthorn bull "Master Hill" [8474] is a chunky, well balanced two-year-old. In Jerseys, "Prince of Wales 5th" and "Daisy" are exhibited, the latter is particularly nice—perhaps unusually deep for her kind, with a delightful tail and brush.

Prince Edward Island.—Benjamin Storey, of Picton, shows three Aryshires, "Sir Walter 2nd," from the Ontario Experimental Farm stock, of the stronger stamp of the breed, as liked by many; "Beauty of Wellington" is also from the same place; the bull-calf "Picton" is a very deep and broad animal of its age.

The Ontario Experimental Farm Exhibit.—It would be better that this was criticised by another, and I shall only, therefore, submit the card that accompanied the animals:—

Four Steers, as Specimens for Exportation, not in Competition.

Breed—Grade Shorthorns, two-thirds bred.
Age—Average, 920 days—2½ years.
Weight—"Chancellor," 1,680lb; "Champion," 1,530lb; "Commander," 1,605lb; Conqueror," 1,595lb; average, 1,602lb.
Increase—1·73lb per head per day since birth.
Food—Daily for 324 days: Corn, peas, oats, in equal parts, 10lb; mangolds, turnips, for six months, 35lb; green fodder, for four months, 75lb; oil cake, for three months, 4lb; Bran, 2lb; Thorley's food, ¼lb.
Cost of Production—Per head, $133.
Manure Value—Per head, for last twelve months, $55.
Present Value—Per head, $121.
Profit Realised—Per head, $43.

Shorthorn Heifer, five years old on 17th September, 1882.

Weight, 1,905lb; increased 2 1/10lb per day during last seven months.
Experimental Feeding—Corn gave daily increase per head, 1·91lb; peas, 1·83lb; oats, 1·60lb.

Twelve Fat Wethers, as Specimens for Exportation, not in Competition.

Breeds—First crosses of Leicester, Oxford Down, Shropshire Down, South Down, and Merino rams with Canadian ewes.
Age—Shearlings, 18 months.

Weights—Per head, average: pure bred Leicesters, 265lb; Leicester Grades, 220lb; Oxford Down Grades, 210lb; Shropshire Down Grades, 210lb; South Down Grades, 180lb; Merino Grades, 150lb.

Food—Peas, oats, bran, hay, green fodder, and oil cake.

Wool—Washed, per head: Cotswold Grade, 9lb, 22 cts; Leicester Grade, 8lb, 22 cts.; Oxford Down Grade, 9lb, 28 cts.; Shropshire Down Grade, 8lb, 35cts.; South Down Grade, 7lb, 35 cts.; Merino Grade, 6lb, 35 cts.

BALANCE SHEET.—MANURE NOT CREDITED.

	Carcass.	Wool.	Cost.	Balance.
	$ c.	$ c.	$ c.	$ c.
Leicester Grade	11 00	1 76	8 10	4 66
Shropshire Down Grade	12 60	2 80	7 00	8 40
Oxford Down Grade	12 60	2 52	7 40	7 72
South Down Grade	11 70	2 45	6 00	8 15
Merino Grade	7 50	2 10	5 50	4 10

Quebec Province.—An unusual feature of your exhibition was a display of fifty animals of five breeds of cattle from the yards of Geo. Whitfield, of Rougemont. Quebec possesses, in private enterprise, as much as Ontario does publicly, an Experimental Farm of rare variety in live stock. It appears to be Mr. Whitfield's desire to thoroughly test the conduct of beefing breeds under Canadian conditions, and for this end is unsparing in means and measures.

First, in regard to his draft of Aberdeen Polls, and this for a very good reason, as, without doubt, it is headed by a stamp of bull rarely seen on this continent. What strikes on the first glance of "Judge" (1150), is his *great length;* there is no coarseness anywhere, and though a side view gives a bold head, a diagonal one tells of a mild countenance; then there is a grandly filled neck vein, yet a somewhat flat top shoulder, without any narrowness however. The bone is of medium quality, and the skin a true Aberdeen one; there might be a broader loin—just the right kind of arch though—and better filled crops; for a bull there is an unusual width of the pin bones. Judge has grand substance, and weighs 2300 lbs.

I am not practically acquainted with the Sussex cattle of which there is a yearling bull—"Bruce Standen 2nd." The first impression is Devon, but this disappears under minute inspection. In comparison with size and weight no doubt the bone is too fine—apparently unable to carry his body, and the head is also on the fine side for a bull. Mark his beautiful bottom line, the splendid shoulder vein, somewhat flat neck; the joining of rib and loin is simply perfect, and a style and depth of barrel like a "man-of-war." We cannot overlook the droop of the hind quarters, however, and a little narrowness at tail—just a little; the quality by skin is decidedly inferior, though it may be a Sussex skin. The beef of this bull goes right down to the hocks.

"Count of St. Cesaire" is a South Devon bull; compared with the Sussex the hind quarters are unquestionably superior; there is the head and horn of a North Devon, but finer, and a great evenness all over, not a bit coarseness anywhere, and yet no delicacy.

West Highlanders.—Among the first, if not the first, and some think should be the last, importations of this kind. But opinions differ, and Mr. Whitfield is of opinion that the Highland bull is one of the correct experimental lines in connection with our North-West grazings. He justifies this by reference to well-known hardiness of the breed, their remarkable quality of flesh, their well-doing from the glens and hillsides of Scotland, and even their weight when matured—maturing however later than a good many other breeds.

"Beauty," a three year old cow, has all the breadth and depth of a small Shorthorn, straight hind legs, flat bone—not coarse, wide behind, broad on shoulder tops and crops—a fine head with Hereford horns—an almost faultless build for a beefer. A specimen of the bulls in "Boby" two years old: mark the peculiar black streaks of hair among the dun, rather short in hind quarters, thick skin with mellowness below, and no want of substance according to size.

The Galloways are headed by "Premier of Landlough," a two year old bull, which combines all the strength and general stamp of the breed—the strong bone, the heavy tail, strong head, long rough hair, the characteristic length of barrel, with well sprung hind ribs, and most marked in depth and width of thighs.

Thus roughly, but to the best of my judgment, was the standing of the cattle at your Kingston Exhibition this year. If any exhibitor has been omitted, it must be charged to himself as I visited every stall, but occasionally found no one in attendance, and it may be therefore that one or two are unrepresented.

II.—The Characteristics of Breeds.

It would not be difficult to sketch the conduct and peculiarities of different breeds of cattle as known in their own habitat, but, what would be the use of such a presentation in comparison with the same thing in other lands? The value to us as Canadians is not so much what is realized in Britain, but how they conduct themselves under different circumstances, and particularly of Ontario.

Taking this view as the correct one, I cannot do better than present your Board with some brief notes on the experience of the Ontario Experimental Farm—an experience now embracing seven years under one man's management.

The Canadian.—I know of no class of cattle so well deserving a first notice in these pages as the Canadian. There is a distinct type entitled to this name. I do not mean those with a touch of Ayrshire, Devon, or any others—not even the Shorthorn grade—but that moderate sized, milking, wirey, active stamp, well known to the average farmer. If this be considered as somewhat indefinite, we shall be glad to point to specimens here or elsewhere.

I claim that the Canadian deserves more notice than has ever been given to it—public and specific—giving a recognized position that cannot be doubted. Have we on record anywhere such a description and history of the Canadian cow as that, when the time comes, as come it will, when the Herd Book editor will require materials with which to trace back to the beginnings of what with him may be as eminent as any Bates or Booth in England? This is no improbable matter indeed, but deserves our serious attention.

Our experience of this breed has been intimate and very satisfactory. We hold by clear and substantial evidence for eight years that the Canadian cow takes no mean place as a milker, a mother, and a field for wide work both for beef and dairy purposes. Much of this is due to her distinct character in some respects: She is decidedly content with her average circumstances—miserable as they be at times—can do as well in the bush as on clover fields, and responds with her best when the thermometer is at zero or 90° in the shade. Her quantity of milk is not so large as the Ayrshire for six weeks after calving, but far ahead in continuance, and therefore, on an average, equal; in cream it is unquestionably superior to the Ayrshires. No one well acquainted with the breeds would choose the Ayrshire against the Canadian, where hardiness and profits under ordinary conditions were elements.

So also in regard to a common source for cheap production of beef with a Shorthorn or Hereford bull. Other bulls have not as yet been sufficiently tried except the Ayrshire and Devon, which cannot compare with these two. While small as a beefer, the Canadian cow is roomy as a breeder, and thus affords field enough for such a purpose.

I am confident that a proper selection of the milking Canadian would add immensely to the dairy and beefing interests of the country.

The Devon.—The remarkable feature of the Devon with us has been an uniform conduct—no coming and going in anything, but an even run of breeding, health, and good

doing under all conditions. Summer and winter the Devon is equally at home—plump on pasture, and in good heart in the stall without grain. They have also been particularly good mothers, nursing their calves in a manner superior to anything in our experience. The Devon calf is always a full calf on its milk alone—rolling in fat and with all the build of an old animal. The particular character of the breed and rich milk give these results. After weaning, and all up to heiferhood breeding there is a distinct heartiness and vigor, on the small scale as regards size; there is no stunting according to their kind, but one has to know the kind in order to appreciate the difference between them and the larger beefers. We have never got much milk from a Devon, but in quality it is second only to the Jersey. The bull attains to a greater size and weight proportionately to the cow than the same thing in most other breeds, as his "get-up" is comparatively more of a beefer than, for example, the Ayrshire bull is against the Ayrshire cow. The Devon cow therefore is a milker in quality and moderate quantity, while the bull gives a frame to the steer that compares well with others for beef carrying. But the steer will not mature so early as the Shorthorn, Aberdeen Poll, and Hereford, nor ever attain the same weight on an average.

The Ayrshire.—We have had a pretty thorough test of the Ayrshire cattle. In sure breeding we have no cause to complain nor can anything be said against their adaptability in raising a calf. Every cow we have has had to be milked three and four weeks previous to calving—an imperative necessity to avoid milk fever; after calving, two of our best have regularly suckled two calves, and in addition have had to be milked with the hand twice daily for two and three weeks, depending upon time of the year, whether on grass or in stall. We have not, however, been treated to that continuance of milk that I was intimate with in the Lothians of Scotland—the great flow lessening more rapidly and dribbling too long. I do not attribute this to actual poorer pasture or keep otherwise, but to the great difference in climatic conditions and the want of that important variety of grasses secured only in permanent pasture. It is not true in our experience that the Ayrshire cow gives a lash of milk on comparatively bare pasture, in which regard she is, on an average, decidedly inferior to the Canadian, but it is true that her milk is of that blue type—not so rich in cream—as characterizes them in their own country. A cross between the Ayrshire bull and Canadian cow is in good repute as a milker with us; they do not loose in size of frame, and gain somewhat in long milking. A cross with an Ayrshire cow and Shorthorn bull has not shown any advantage in milking and very little in build for beefing, though the steer is vigorous and growthy, but too slab-sided and wedgy—taking too much after the mother. Practically then as regards the pure Ayrshire they require good treatment in order to maintain their famous milking properties, and I am of opinion that an infusion of new blood is as often needed as in any other breed—not so much a change of bull from other herds in this country as that of a directly imported one.

The Hereford.—This breed has exhibited a very clear and steady line of conduct all throughout. No trouble in breeding, and no petting required. The Hereford is a good mother, second only to the Devon in our experience, and ahead of its dangerous compeers—the Shorthorn and Aberdeen Poll.

We have been charged with partiality and lack of practical experience in cattle life, by one of our American critics—especially in comparing Herefords and Shorthorns. This is not true, and I trust will never be so. As responsible to a Liberal Government, and guiding a grand country, it is, above all things, our religious duty to report just how it is in every case—no colouring, no exaggeration, and no understatement of anything whatsoever. To say more, is unnecessary; to say less, would savour of want of interest.

The Hereford, I repeat, has shown an uniformity of conduct quite exceptional along with the Devon; without grain, winter and summer—bran excepted, and the usual treat, after calving. The Hereford keeps fat on pasture and in the stable, never falling off, even when suckling. Greedy enough, no doubt—down to the horse manure—not a speciality, as showing a want of something, but a consistent looking out for number one. We have no breed, as a whole, nor individuals among breeds, that can touch the Hereford in maintaining flesh on pasture. Indeed, we have cases of too much tendency to covering the ribs, and taking from the calf; and a peculiarity of their build is the

being deep in calf and not showing it, as is otherwise in most other breeds—the calf also coming, without affecting the mother's appearance much.

The fattening steer, from the Hereford bull and Canadian cow, is quite characteristic. The marking is strong and unquestionable; the build is a Hereford in almost every detail, the pig ham (as age advances), the round, compact barrel, longish rumps, deep twist, and the general low, chunky set of the whole animal.

The Shorthorn.—We have never treated one breed of cattle or sheep differently from another, unless special circumstances demanded it; thus then, these comparative notes are the more valuable and reliable. I say this, here, because Shorthorn history, with us, has been more complicated than with other cattle; not, certainly, by reason of want of variety in blood and family, nor even numbers, to make a good average—for we have, or have had, plenty of both. With Shorthorn leanings, as an individual, I can freely and fearlessly, nevertheless, record how Shorthorns have conducted themselves with us for seven years.

We can speak highly of the milking properties—in quantity and quality—of the most of our cows of this breed,—making good calves, or reliable milkers, as the case may have been. We have nothing to say against the sure breeding of the cows, but our four bulls, in these years, have not given satisfaction in this respect. Without exception, they have caused delay, loss, trouble, and extra expense. Why, I am not prepared to say,—two were imported and two Canadian bred; none were ever in such high flesh as those of some other herds; indeed we have noted, very distinctly, that those bulls, in best flesh—that is, on the heavy side, have been surer in getting than those on the less fleshy side. But, and I desire most seriously, to make this "*but*," once and for all, understood, we have never fed Shorthorns differently from others; if we had done so, this would be no *experimental* station. Understand what I mean by this. If we have a two-year-old Shorthorn, with a large frame, weighing 1,600 lbs., and a Hereford, exactly of the same age and of a somewhat smaller frame, weighing 1,500 lbs.,—we feed them according to weight and size,—a little more to that weighing the most; this is in agreement with all rules of common sense as well as with science and physiology—not breed, because we do the same thing with individuals of the like breeds: *But*, we have never fed the Shorthorn, because he was a Shorthorn, nor the Hereford, or Aberdeen Poll, because of their kind. This is the true experimental idea, we think. If, 'tis said, the choice of individual bulls was bad, then the reply is, that three independent judges did so; if management, by want of practical knowledge is charged, then, the same management had to do with the other bulls that have stood so well. If the Shorthorn requires, on an average, more drawing-room attention than other beefing breeds, then it had better be acknowledged at once, and I don't think their admirers need be ashamed of the fact.

We have fattened Shorthorn grades, Hereford grades, Devon grades, Ayrshire grades, and Galloway grades for beef, both in the stall and on pasture, and nothing equals the Shorthorn, in giving that stamp to produce weight in the shortest time on *Ontario conditions*—growth of youth on good pasture, and finishing in the stall.

The Aberdeen Poll.—We hold the honour of having introduced this breed to Canada as put by Mr. McDonald, the clever author of "Food from the West," as well as the recent work on Aberdeen Polls, and who is also editor of "The Irish Farmers' Gazette."

Our experience, thus far, is somewhat irregular: Health and breeding have been very good; milking sure, in moderate quantity and rich, with plenty of flesh both in stall and on pasture, yet we have to record an indefinite sort of instability, difficult to explain—I speak now of the first imported animals and their progeny, not of 1881 purchases. The instability in question has reference to a coming and going of health, especially in summer, as indicated by change of coat and general "staring" of the whole animal, as if going through a course of medicine. Individual animals of any class often do so, as everybody knows, but not a whole herd of one kind There has been no sickness actually.

We have on hand four very fine steers—the first cross of an Aberdeen Poll bull with Shorthorn grade cows, with which we trust to convince the Province, ere long, as to the eminent beefing properties of the Black Diamonds of the North of Scotland.

THE FLOCKS OF ONTARIO.

A flock may consist of any number. A pen is more definite, and usually made up of one ram and ten ewes. Ontario is not bright in wool and mutton, in comparison with cattle. Were she so, there would be 60,000 in place of 8,000 thoroughbreds. During the early settlement of the country, sheep were not wanted; things were too rough—bush life is not good sheep life, and though the housewife of those days would like to have had her spinning-wheel at work, the greater need of food would overrule. Gradually, however, as cultivation increased and wealth and leisure grew, mutton and wool were wanted. Then all over, as now in too many cases, it was weight or quantity of everything, more than quality, so that long-wooled breeds were known long before any others. We have evidence of this as follows:

Some early Importations and Breeding of Sheep in Ontario.

Year.
1834—Leicesters, by late Hester Rennelson, North Dumfries.
1835—Leicesters, by James Cowan, Galt.
1838—Leicesters, by William Ash, St. Catharines.
1842—Leicesters, by William Whitelaw, Guelph.
1843—Southdowns, by William Ash, St. Catharines.
1846—Leicesters, by William Douglass, Onondaga.
1850—Cotswold, by James Russell, Richmond Hill.
1850—Lincoln, by W. & H. Gourley, Carp, Carleton.
1850—Southdown, by Rob't Marsh, Richmond Hill.
1850—Southdowns, by H. H. Spencer, Brooklin.
1850—Lincoln, by Albert Tamblyn, Orono.
1854—Cotswolds, by John Snell, Edmonton.
1856—Cotswold, by Henry McGurk, Colinville, Lambton.
1859—Cotswold, by R. Rennelson, North Dumfries.
1860—Southdown, by W. E. O'Brien, Barrie.
1862—Southdown, by John Jackson, Abingdon.
1864—Southdown, by A. Smith, Aberfoyle.
1865—Southdown, by T. Wilkinson, Renton.
1865—Southdown, by R. Rennelson, North Dumfries.

Previous to the year 1842, therefore, the importation and breeding of Leicesters were not uncommon with the men who still lead us in the same thing, and even up to 1850, with one exception, the examples of early work were among long wools; not only so, for, even up to 1860, we have but three cases, so far as returns obtained by me show, of Down breeding, so that practically long wools were a quarter of a century in advance of the short wools.

At the present time the Leicester and Cotswold are upon an equal footing by numbers, so that as the Cotswold era began in 1854 there must have been a decline in Leicester patronage and a corresponding increase to that of Cotswolds. The Lincolns have never got a strong hold in Ontario, and at this date can be told inside of one hundred rams and three hundred ewes—a mere handful, of course. So also with the Merino. Indeed the Merino has not any place in Ontario, whatever Mr. R. Bailey, of Union, county of Elgin, may have to advance to the contrary. The reasons for this are good and practical. As recent Britishers we are unacquainted with them, they give but indifferent mutton, they are slow in maturing and unprolific, and they are a ranging and unkindly breed, ill adapted to the small farms of a wooded, newly-improved country. In these days, anywhere, even in our great runs of America, California and Australia, a mutton crop is wanted along with the wool, and consequently a change is urgent.

Next in order of introduction to the Province were the Oxford Downs, and this, so far as can be ascertained, by the Ontario Experimental Farm in 1876. They have not

made that rush which many predicted—still in the hands of a dozen and numbering about two hundred head.

The earliest record of the Shropshire is by William Donaldson, of East Zorra, Oxford county, in 1867, and they are now far ahead of the Oxford in distribution and numbers —over five hundred in all—in the counties of York, Simcoe, Middlesex, Ontario, Huron and Wellington.

The relative numbers of the different breeds of sheep in the Province may be thus illustrated :

The Conduct of Breeds of Sheep in Ontario.

For the same reason as given in my report on Cattle herewith, it is as much in place to submit the experience of The Ontario Experimental Farm with Sheep, since the year 1875, and, in addition to the pure breeds, a few words upon the Canadian ewe will aptly precede.

The Canadian Ewe.—What is she? A very difficult question to answer. If roadside samples be taken as a guide, she is everything and nothing, most clearly. The reference to the roadside bids me say that of all kinds of pasture in Ontario—I cannot speak of other Provinces—whether rotation, permanent, bush, or cleared wild pasture upon farms, none equals much of what covers one-half of our highways. It is a close mat of the better native grasses with white clover, offering at all times a rich sweet bite for sheep, and is top-dressed every heavy rain by the washings from the traffic-manured centre. As each township on an average possesses about 250 miles of opened roads, of which one-half of the area is under such pasture, there are actually one thousand acres of an excellent sheep run able to maintain at least 1,000 head annually. This is no fancy, and I do not care though some sceptic halves it—say 500 head, therefore. There being 300 townships in older Ontario, we have the magnificent figure of 150,000 sheep that could, at the lowest estimate, be maintained, at no risk or annoyance to anybody, on our highway pasture. By the August statistics of our Bureau of Industries, there are 2,000,000 sheep of all ages and kinds in Ontario—say 1,500,000 for the older parts referred to—which shows that one-tenth of their number either are or should be kept upon the roads, allowance being made for the thoroughbreds that are not allowed such liberty. The annual value of this "commonty" cannot be put at less than $300,000.

The Canadian ewe, on an average of localities as influenced by great centres of long and short wool pure-breds, is a mixture of Leicester, Cotswold, Lincoln and Southdown in all degrees of variety, but generally with a predominating Leicester type. She is roomy according to size, fairly well woolled, weak forequarters, ewe-necked, and combines hardiness with ability to raise a good lamb, and give above an average quality of mutton.

The Leicester.—After the Canadian, which traces so much to Leicester, the same Leicester deserves our next notice. Our experience has been nearly altogether with the Border type and not the English proper which, it is now well agreed, differ only as affected by conditions of upbringing, not in blood or original source. We have nothing in sheep life that can touch the Leicester in being early ready for any purpose—on getting what it likes. Breeding has not been so sure or prolific—about one lamb per head ; they are but moderately good nurses, being too selfish in the disposal of their food ; the Leicester is essentially a "bear" in character, laying on fat for hard times, and hence the abundant supply of milk is not prominent on an average. Lambs come with a delicate bearing,

but once over the first month their progress is wonderful. Friend Bakewell's soda-water bottle is still a feature in their build, and so also is the want of wool below, on young as well as old animals. Thus we have evidence of the prepotency of the Leicester. The fattened wether with us is simply an extraordinary piece of mutton—I mean the shearling wether, as nothing else is admissable in these days of sharp profits—the immense depth, breadth, and prominence of the forequarters, the filling-in of the arms and thighs, and the general bunching of outside fat, is a fine piece of study, peculiar and curious. Who would eat it? Not many by choice, certainly, and very few by compulsion when the shearling weighs 307 lbs., as we had this year.

The Southdown.—England's choice mutton—the great little breed of its chalk hills. We purposely place this after the Leicester as, in our opinion, it is a Leicester in build and maturing. It is difficult to do justice to this breed with pen and ink, because it is easier to describe a faulty animal than a perfect one.

I desire to record, without any touch of doubt, that the Southdown is unmistakably our best friend at Guelph. I say Guelph because, as in any sheep life, conditions of climate, altitude, soil, vegetation and management affect so strongly that their conduct differs very strikingly, even on neighboring farms. Friend here means one and one-half lamb per ewe—coming early, strong, plump, and with all the build of a mature animal. The average weight of a *newly-born* lamb is as heavy as the average of any other breed. The Southdown is a splendid mother, doing as well to two as the Cotswold does to one lamb; no doubt she does not do so on nothing, as in comparison with size she is a great forager. So prominent is this breed in milking properties that any difficulty we have had in udder affections has been with it. The Southdown do not go and come in flesh so much as any of the other breeds in our hands, and they are much less subject to disease, and when under any trouble they recover sooner and are more reliable afterwards; these are very marked facts in our experience—away above all doubt.

In regard to fattening and the power of improving other breeds, or rather the production of wool and mutton with the common grade ewes of the country, it is on record elsewhere in this report that while less in weight there is a value of these products that places the Southdown second to nothing, and equalled only by the Shropshire.

The Cotswold.—We have had a larger flock of Cotswolds than others, and as true animals of their kind, as in any other. The gray face and the larger stamp of the white faces have been handled here. One and one-fourth lamb per ewe is the average produce. They do not come so strong and so well made-up as the Downs; but once fairly into milk and extra food, make rapid progress. The ewes are moderate mothers and great eaters. We have no breed so liable to catarrh or "snifters" as this, and we hear the same complaint from other breeders. Sudden changes of weather, a wet bed or any unusual climatic condition is sure to bring nose runnings; even the newly born lamb is sometimes affected. The Cotswold maintains wool in quantity and quality well, and longer than the Leicester. In fattening we cannot finish them so early as the Leicester, South Down or other Downs, and they are slower at taking on the "last dip," but for great weights nothing can beat them.

The Merino.—The extremes in sheep life with us are the Cotswold and Merino, the size and coarse wool of the one, against the size and fine wool of the other; they are alike in slower maturing—the Merino is too unsettled, and too much of the racehorse stamp to fill our views of a modern mutton producer. But practically our experience in pure breeding has been very limited—has been more in the line of testing the value of the offspring of a very fine French ram with the common ewes of the county. The marking in frame and wool is most striking—never doubtful even to the temper. Wool from hoof to horn—wool everywhere except a small part of the face and muzzle on the grade. The clip, in weight and quality stands high, and the fattened shearling wether has surprised us in weight and good handling, as to which see special notes in my Farm Report in killing of various grades.

The Shropshire.—We like this breed for several good reasons, as had by our own experience. It is reliable in breeding and prepotency, the ewes hold flesh easily and without danger, are average mothers—not equal to the Southdown—prolific, one and one-half lamb; give a heavy close crop of medium long wool of fine texture and average

lustre. In weight of carcass and wool it stands between South and Oxford Downs. In competition with the five other breeds, the Shropshire is equalled only by the Southdown in value of annual productions, and where extreme quality of flesh and wool is not the sole object of the flock-master, but more weight of both crops and somewhat less quality, then the Shropshire will lead in much of our future in Ontario.

The fattened grade wether is a nicely balanced piece of mutton, a little on the late side of maturing, not broad enough in the fore-quarters to some minds, and just a little leggy, but grand quality in bone, as well as handling.

The Oxford Down.—The most modern of improved sheep, and showing much of the size and nobility of one of their progenitors—the Cotswold. If it be true that the issue of a Cotswold ram with a Hampshire ewe was the origination of this breed then Cotswold power must be strong, because, as I have said, size holds, and the more open and coarse staple of wool also tells of Gloucestershire influence.

We hold the honour practically of introducing this breed to Canada in 1876, when, advised to purchase Lincolns, we preferred to give the Oxford Down a place. Anticipations have been very satisfactorily realized. For early maturing, maintenance of weight, power to produce through the common Canadian, making good mothers, and giving *one and two-thirds* lamb per ewe, no other breed equals the Oxford Down, on an average. Value, in these times, of course, is not necessarily implied in such a strong statement as this, but, to those who desire a medium wool—on the long side, somewhat open and coarse, comparatively to other Downs—a heavy fleece, a strong square frame, early flesh of good quality, with ability to reproduce these through a common source, the Oxford Down must command a high place.

Sheep at Kingston.

Leicesters.—William Whitelaw, of Guelph, one of our earliest importers, and still a leader in the breeding of the Border type. I am confident in asserting that Mr. Whitelaw never exhibited anything but pedigree sheep ; he would not even think of trying an English Leicester upon his Borders let alone other long wools. He is a true and reliable breeder, a systematic advocate of frequent use of new blood, and much of it to be from "home," as well as not afraid to show what the Leicester can do in carrying flesh when required. I like the quality of his flock, which is very even all over without any delicacy. He is particularly successful in maintaining wool both in quality and as an even crop over the carcass. This exhibit maintained these points in perfection.

John Kelly, jun., of Shakespeare, has a standing of twelve years among the Border Leicesters in Ontario, and a better practical judge of them is seldom met with. His acquaintance did not begin here, and his enterprise is not confined to what can be found here. His last importation was from Mr. A. R. Melvin, Midlothian, Scotland, among which some rams of rare merit are still in use, one of them being now at the Ontario Experimental Farm. There is plenty of character and no want of quality in the samples from Mr. Kelley's flock on exhibition. Andrew Murray, of Clanbrassel, is also an exhibitor of Leicesters, pure, strong and well wooled, from Bow Park herd.

Cotswolds.—Henry Arkell, of Arkell, a modern importer and breeder to a very considerable extent. A two shear ewe is very lengthy and a grand one all over, with the exception of somewhat open wool. His two shear ram from Gillet, of England, of the grey faced type is strongly built, and otherwise a fine animal, but with the like open and somewhat strong fleece. Mr. Arkell showed 16 Cotswolds.

Peter Arkell, of Teeswater, shows one gray-faced ram lamb, with a strong coat and a vigorous frame. The beginning of the flock goes back to the year 1866.

James Main, of Milton, exhibited some good sheep of this breed.

Lincolns.—Andrew Murray, of Clanbrassil, had several Lincolns on exhibition. The ram has the characteristic wool, is lengthy, strong of course, and generally good. There is a very fine ewe weighing 285 pounds, which, however, is weak-loined for the size.

Oxford Downs.—Henry Arkell, of Arkell, had twelve head of these in competition, the average stamp of which was first class : all were beautifully covered with wool in quality and texture, and indicated their character as early maturers of flesh by handling

and general appearance. Some were rather strong in bone, and would be better with less leg.

Peter Arkell, of Teeswater, with fifteen head, had a shearling ram, more regular than his brother's, and even superior in wool, if possible. He has four specially fine shearling ewes, square, deep, compact, heavy, and stylish; as well as two ewe lambs of a particularly taking style.

Hampshire.—The county of Grenville is at present a centre of wealth by the enterprise of one man. W. T. Benson, of Cardinal, is an importer and breeder of Shorthorns, Herefords, Cotswolds, Oxford Downs, Shropshire and Hampshire Downs. He is the only exhibitor of this latter breed of sheep, now so highly recommended for Ontario purposes. I do not like the two-shear ram under examination, he is an oddly long and narrow animal, a long neck also, the well-known strong head, but wool of grand texture and density. The shearling ewes are beautifully built, and compact.

South Downs.—The closest competition among sheep was with these, and between three of Ontario's best men. Robert Marsh, of Richmond Hill, is among our oldest, and one of the most eminent breeders of South Downs. Thirty-two years is a long time—it is for all purposes the history of Ontario—to stick to one breed as he has done, always certain of his work, never despairing, and now reaping a golden harvest. He likes the Webb and Walsingham blood, and his flock at present number over one hundred head. His "Prince of Wales," from Sandringham, is a ram of fine quality and good substance, lengthy, and just a little pointy behind. The two shear ram "Henry Webb"—of famous South Down memory in England—is not so strong loined as the other, and yet of a stronger stamp otherwise. Two ewe lambs, from Coleman, of Norfolk, England, are unquestionably of remarkable quality and size—not a rough size, and there is wool everywhere—ears, and absolutely everywhere except the nostril.

John Jackson, of Abingdon, as already noticed, began breeding in 1862, and is now taking to the "Henry Webb" blood. He shows twenty-seven head in all—the largest on the ground. The two-shear ram "Colonel Webb 45" is of the reachy stamp of South Downs—very fine no doubt, but somewhat lacking behind. Mr. Jackson is very enterprising, and not afraid to use good blood from any quarter; always pure and reliable.

Thomas Wilkinson, of Renton, shows twenty head. His flock is deep in Coleman blood by recent importations, and his work goes back to the year 1865. The shearling ram "Coleman 1882" is a very lengthy sheep, with a somewhat heavy head, and just a little slack-loined, but a fine one nevertheless. I was so taken with the ram-lamb as to secure it for the Ontario Experimental Farm; for size, style, wool and constitution I did not see his equal. Shall I add that he is on the strong side for a Southdown? The shearling ewes are simply perfect—vigor, room, and such fleeces.

Merino.—George Hood, of Guelph, shows a French Merino ram, of the Ramboulia blood, the late French Royal farm flock. This is the heaviest of the kind, much over the Spanish or Saxony, and equally well woolled.

There was another exhibit of Merino—by whom I could not ascertain—of the American stamp. If they were so, pity the shepherds who have to do with such scraggy, dirty, long-tailed, small things—an irregular bunch of very fine wool, without carcass.

Fat Sheep.—Little competition, but large merit. Ontario would practically have no name in this line but for George Hood, of Guelph. No better judge of a sheep anywhere, few with equal enterprise, many less liberal, and none who has swept the American continent as he has for some years past with fat sheep. Mr. Hood, as I write (24th November, 1882), is again at the Chicago Fat Stock Show, and, with his own material and a draft from the Ontario Experimental Farm, has, I think, surprised himself. The Leicester grade, Cotswold grade, Oxford Down grade, Shropshire grade, South Down grade and Merino grade wethers in his hands are an exhibit rare and valuable of themselves—a study and a guide to the Ontario farmer who desires to know what to do.

III.—Herds and Flocks unrepresented at Kingston.

Many of our best herds and flocks were not represented at Kingston. As I have material wherewith to make a book, even were it necessary, upon what must always be

an interesting and valuable subject, you will allow me to submit a running reference to some of the principal of these herds and flocks. I shall possibly overlook some that are more important than these because of want of personal knowledge of them, or that may be unknown to me by reputation. In this I trust those interested will be assured of my perfect disinterestedness, other than its national significance.

Take the northern section of the Province first. Our information leads as far north as Magnetawan, where in the hands of Mr. Holditch "Royal Charlie" [1833 reg.] must be doing good Shorthorn work among the northern pioneers; this animal is from the herd of Mr. Bridges, Shanty Bay. Mr. Holditch, who has also some really good Cotswolds and Southdowns, deserves, of all men in Ontario, our heartiest "well done." Mr. Muntz, of Alport, Muskoka, was the first to introduce Herefords north of Orillia. His herd of thirteen include some animals of a type equal to any in the Province, and are principally from Mr. Bridges, Shanty Bay. His choice of England's famous grazier for meadow and rock was theoretically good, and, it is to be hoped, is now practically realized. So also are his Southdowns from F. W. Stone, of Guelph—as evidence, one hundred grades now luxuriating. A considerable patronage of Devons exists in Mara, per George Boulton, and with W. Calverley, of Orillia—the one from the herd of W. C. O'Brien, Shanty Bay, and the other from G. Rudd, Guelph—their success must be satisfactory, as both date back to 1876. Associated with these, in both cases, are flocks of Southdown, from the old and careful breeder, Mr. Cuppage, Orillia, than whom few can talk Shortwools so well. In breeding of Herefords, C. A. Bridges, Shanty Bay, near Barrie, has ten years' experience, and his present standing in merit, if not in numbers—40 head—is possibly unequalled on an average. Beginning with a draft from Mr. Stone, Guelph, he has since added materially to the herd by direct importations from England. Mr. Bridges is also high in Shropshire fever—the largest flock (109) of these in the Province, I think, and in addition has over 50 Southdowns of Marsh blood. Simcoe is more than well up in modern live stock; but these are not Simcoe's limit—Dr. Morton, of Bond Head, is a breeder of Shorthorns and Southdowns—"British Statesman" [8175](42847) being at the top of his herd; E. D. Morton, of Barrie, is also a Shorthorn and Southdown patronizer of no little merit. "Baron Gano 2d" [4578] leads the herd, and Marsh prevails among the flock. Then there is first-class breeding of Shropshires by Dalton McCarthy, M.P., Southdowns and Shorthorns by John Srigley, of Allandale, and not least, though last named, is Walter Raikes, of Barrie, who has twenty-two years experience with Shorthorns, and holds at present "British Hero," (39506)—representation of a valuable and well-known family in England's live stock. Striking west to Grey County, near Owen Sound, we speak to W. J. Paterson about his Princess bull, "Rosy Prince 4th," [9280] and a score of good cows and heifers; then to Bruce, where Richard Rivers, of Walkerton, is nearly as bright in Shorthorns—having "Seraphinas Duke, 2d," [7846] with Southdowns from Stone and Anderson; Leicesters from Whitelaw, all of Guelph, and Cotswolds from the Snells of Brampton. Mr. Rivers goes back to 1867 as a flock master. Bruce has also Robert Gowanlock of Cotswold and Leicester renown, as well as James Thomson, Mildmay, who can speak of experience with Leicesters in 1850, and in closing the northern trip we must not omit Henry McNally, of Maple Hill, as a Shorthorn advocate, as well as Robert B. Fleming in Leicesters.

I wish I were able to do justice to the west midland counties with all their age and wealth of cattle and sheep In bearing south from Bruce we find R. & W. Scott, of Harriston patronizing the Experimental Farm Licesters, and Durham blood from James Brown, of Galt. Near Alma, in Wellington county, also, we could profitably take a day with the Messrs. Hunter. These gentlemen take a high stand in the Province as careful breeders—men not afraid of England's Two Thousand Guinea yearling bulls and heifers, and believers in Booth with pedigree. It would make a big tree to trace all the Hunter's have done for the Province since 1868. Their present bull, "Socrates" (45640) is from the rich herd of Hugh Alymer, of Norfolk, England, which I have not seen since its introduction to the Alma herd, but opinion is high upon his merits, and breeding is vigorous. There is no want of field among the splendid lot of cows and heifers. The Hunters have taken recently to Shropshire sheep, by importing from the Earl of Zetland and Lord Strathmore. Near neighbours and wholesome rivals to the last

herd are J. & W. Watt, of Salem. I know of no men in Ontario who attain to so much success so quietly, and what they have done since 1864 must be wide and deep. To be Aberdeen Scotch may be something, but to be practical and thorough may be more in their business. Breeding Shorthorns that can safely (remember safely) lay on plenty of flesh are not plentiful in this country, and it is well known with these gentlemen that unless a large part of the pedigree is on the back of the animals, paper pedigree will not do. They possess a very fine herd, with "Barmpton Hero" [6595] who has swept the prizes of the Province again and again. What more need be said? Within gunshot of the Watts is Joseph Thomson, with a large flock of Leicesters, and a good name as a beef maker by use of the best Shorthorn blood, where we note the "Bold Buccleugh" in possession.

Fergus has memorable surroundings, also—so many indeed, that I beg indulgence for what may be omitted—the Rennies, the Dows, and others; and then to the west the prominent breeder of—allow me to call them—Scotch Shorthorns, John S. Armstrong, of Speedside, with his clever sons. Mr. Armstrong is certainly the most cunning fattener of a steer in our Province. By cunning I mean the knowing everything and not blazing it abroad, as some like to do for the sake of notoriety. To know what a calf will be exactly, when three years old, is just what we would all like to attain to. Mr Armstrong can do this, can give two thousand dollars for a bull calf when needed; the finest finished steer I have seen in Ontario came from here. He has a grand herd, led by "Butterfly's Duke" [8190], and a very choice flock of over thirty head of Oxford Downs sheep. Southwards a piece we come to Armstrong's Mills; to Matthias Kirby of this place we have few equals in general knowledge of cattle and sheep; his Shorthorns are from F. W. Stone's herd, and Cotswolds from the Ontario Experimental Farm. He has a quarter of a century's experience in this country as a breeder of sheep. Down to Guelph, and among those not already mentioned in another part of Report, we have Harold Sorby, a very prominent young leader in Cotswolds and Southdowns of the Swanwick, Gillett, Tombs, Jacobs and Experimental Farm blood—ninety head of such stamps mean a large interest. A gentleman, not much heard of in show circles, by reason of choice, is John I. Hobson—now of prize farm judging fame—from whose herd of Shorthorns come some of the most fresh and serviceable bulls of the district. Eastwards we touch E. H. Barclay's, near the Experimental Farm, a late importer of Aberdeen polls, whose naturally quiet and safe judgment had been confirmed as a student of the Agricultural College. Another student of this College, already making his mark among Southdowns and Ayrshires, is the son of James Anderson, Puslinch. We cannot close Wellington county without calling upon Alexander Smith, of Aberfoyle, fairly up in Southdowns, and in possession of "Lord Knightly," from Stone, and upon J. B. Bessey & Bros., of Limehouse, where a score of very superior Ayrshire cattle have just been established.

In Waterloo county we have James Brown, of Galt, with the "Duke of Sharon, 10th" in a small but select herd of Shorthorns, and an unusually large flock of Leicesters. Mr. A. B. Snider, of German Mills, has had ten years handling of Shorthorns—taking renewals from the reliable herd of James Cowan, whose position has already been noted.

I feel rather diffident about entering Brant county, which has the honour of counting Bow Park among its stars. The highest compliment I can pay this institution is that it stands as an establisher of breeders. It is in fact the Kirklivington, the Warlaby, the West Dercham Abbey, of Canada—indeed of the American Continent. Its management is one of the most practical, far-seeing, and thorough character in the hands of Messrs. Clay & Hope—all honour to the memory of the Hon. George Brown, nevertheless. The great lesson of Bow Park to Ontario is the adaptability of the country, in healthy conditions, for the most complete development of England's great stall-feeding cattle—management allowed for, of course—and the lesson to every one is what one animal can do *when of the proper stamp.* I have not had the pleasure of seeing "Fourth Duke of Clarence" (33597) for some time, but, if now as then, England cannot beat him. The substance, the immense *vigorous* substance, with wealth of flesh, character and quality were to me most remarkable. Bring along the skeptic in blood and pedigree now: in all

the possibities of animal construction as influenced by man, what imagination could build this in a few years,—a few years indeed;—the beginnings of this grand animal were as patent in 1782 as they exist to the eye in 1882, and had no *straight line* been kept during these one hundred years there would be no "Fourth Duke of Clarence."

In Halton County we have the energetic Green Brothers, of Oakville, with Shorthorn, "Cavalier" [8214], from the Dryden herd, that has been giving excellent stock; and R. B. Ireland, of Nelson, with a large herd of Shorthorns and Lincoln sheep—"Mazurka Duke" [5703] being at present in use.

In Peel, Hugh Clark, of Brampton, has been among the Jerseys since 1871.

York county is still well up in good old names. The Russells, of Richmond Hill, with seven score of the best Cotswolds England can offer, and a herd of Shorthorns of rare merit, at present led by "British Statesman" [8175] (42847). Twenty years of unflagging Shorthorn breeding have made the Russells a household word, and they well deserve it. Mr. Seth Hancock, of Kittleby, patronizes imported Shorthorns, and Southdowns from March, having a large number of each. Then Dr. Morton, of Toronto, claims a visit as a recent breeder of Ayrshire cattle and Southdown sheep. An Ontario leader in Jerseys is William Rolph, of Markham, who possesses a herd of two dozen very straight bred animals of the best type of the great creamers, and as many Shropshire Down sheep of recent importations.

Wellington is strong; Middlesex is not weak; York can speak, and Ontario County is not one whit behind any of them—so much field indeed in live stock virtues that the difficulty lies in avoiding offence giving. In order of age we notice J. S. Thomson, of Whitby, as a breeder of Shorthorns, beginning in 1857, and now in possession of "Scarlet Velvet," [7833].

In connection with this preliminary effort of mine upon the Herds and Stocks of Ontario, J. I. Davidson, of Balsam, writes me:—"I think it will be valuable, if your time will permit, to do the subject justice, but if you were to give a description of them as H. H. Dixon did in *Field and Farm* you would require to make a personal inspection, and then you would do the breeders and their animals justice." Thanks, Mr. Davidson, and I conveyed your suggestion to the Council of the Agricultural and Arts Association, who highly approved of it, but felt unprepared to carry it out this year. Mr. Davidson goes away back to 1860 as a breeder of Shorthorns, and has imported no less than sixty from Aberdeenshire alone, knowing long ago, as the Americans are now realizing, that the Scotch stamp of the Shorthorn is better adapted to our continental conditions than the most of others. Chicago said so during the last Fat Stock Show. Mr. Davidson pays close attention to constitutional vigour, and is a thorough, practical, and cautious handler of stock cattle for breeding. In 1864, the Drydens, of Brooklin, took a strong position among Shorthorn men, and have since shown no back going. John Dryden, M.P.P., as the present proprietor, is firm and clear in all that belongs to such an interest—never doubting and always reliable. He has of late made an important addition to the herd from Scotland, which now owns "Baron Surmise" [6620] 28855. One of the largest, if not the largest, flock of Shropshire Down sheep is in Mr. Dryden's hands. In our previous notice of Mr. Guy's exhibition no mention was made of his flock of Leicesters and Southdowns. As a sheep breeder he dates back to 1862, and to 1864 in Ayrshire cattle. Arthur Johnston, of Greenwood, is certainly one of our most enterprising importers and breeders. Johnston and Cotswolds is now an old story, and his present flock of 120 is in high repute both in the State's and Canada; these are of Gillett, Kilkenny, and Faringdon blood. Mr. Johnston has also a large herd of Shorthorns. James Miller, of Brougham, has not favoured me with a return of his herd, and therefore I cannot refer distinctly to age and numbers, but the Miller's held no second place in Ontario records in breeding and feeding of Shorthorns, and I find many of our best breeders referring back to them as having started herds. At Ashburn, Wm. Heron & Son hold a more than average herd of Shorthorns under "2nd Prince of Springwood" [5978], and this was established from the Miller herd in 1868. The Messrs. Heron are recent importers of Shropshires from the Earl of Strathmore, Scotland. Another of the Brougham credits is the herd of James Graham, of Port Perry, dating from 1871, and a Cotswold flock that cannot but stand high under such names as Tombs, Miller, Johnston, and Hodgson. We

have, in closing Ontario county, a record of Hereford cattle in the herds of R. J. Mackie, of Oshawa, who took his first draft from F. W. Stone, of Guelph, in 1874, and subsequently, on two occasions, from the Ontario Experimental Farm. The stock bull here, "Duke of Argyle," an animal of particular quality, is from the latter place.

Durham and Victoria counties have not tempted me to say much, but, of course, the material may be there nevertheless. Mr. John Dix, of Little Britain, stands well in numbers of Shorthorn and Leicesters.

Peterborough can also tell of twenty years' experience in Shorthorn and Leicesters—a herd of sixteen and a flock of fifty head belonging to Henry Collins, Warden of the county.

In Northumberland, I have pleasure in mentioning John Isaac, of Bomanton, with over twenty head of Aberdeenshire Shorthorns.

H. B. Rathbun & Son evidently make the County of Hastings their own in Shorthorns and Jerseys.

Joseph Youill, of Carleton Place, County Lanark, can not only count over thirty-five Ayrshire cattle, but is still in possession of "Carrick Lad" [58], winner of the Gold Medal, at Philadelphia in 1876. There is a large flock of Leicesters here.

For twenty years, William Rodden, of Plantagenet, Prescott county, has been a breeder of Ayrshires by direct importations as also from the Dawes of Lachine, and Sir W. Logan—now a very handsome herd of Scotland's heavy milkers. Mr. Rodden also patronizes Leicesters. He holds special and general awards from 1876, Philadelphia.

One touch of Glengarry, in the case of R. R. Sangster, of Lancaster, a breeder of Shorthorns and Leicesters, and we shall return to the west.

Norfolk Model Farm has not sent me a return—thinking, maybe, that Messrs. Hobson & Drury said enough in their report to you on prize farms. Mr. Carpenter is entitled to all you have heard of his establishment. H. Glagebrook, of Simcoe, is another of Norfolk's smart men—keen and enterprising, and, though a recent settler, is investing heartily in Shorthorns, Ayrshires, and Leicesters. He prefers Bow Park, and Experimental Farm blood.

Oxford county has many good men and good herds and flocks. F. W. Dobbie, of Tilsonburg, can show many fine Leicesters, and a few Shorthorn cattle, dating from 1871. William Donaldson, of South Zorra, is a modern sheep fancier, having a very handsome collection of the Shropshire from Miller & Beattie, and over a score of Shorthorns with "Fancy Prince 2nd" [8557] in command. The Eastwood herd and flock are of themselves a big thing for Oxford, and the Province. Mr. Pattison is a good judge of cattle and sheep, not to speak of horses—a fact not always following a writer and half city resident. His catalogue is evidence of careful work among Shorthorns, and many of his animals could stand beside the best we see at our principal exhibitions. Mr. Pattison is also a believer in Shrops, having, I think, the largest flock in the Province—over one hundred head. He likes their hardiness, their class of wool, and their power of producing quality of mutton upon the common ewes of the country.

Should we cut a niche in the post at finding Ayrshires in Oxford? they are certainly outside of their warm ground, as told by the accompanying map. Mr. Thos. Nichol, of Plattsville, has a few, but is more prominent in Leicester sheep. Robert Williamson, of Ingersoll, has "Tam O'Shanter" from James Cowan, of Galt, a Shorthorn bull that should suit dairymen as against other strains.

The county of Perth can also quote Ayrshire to one considerable extent, at least, as found with Michael Ballantyne, of St. Mary's, and George Rock, of Mitchell, holds a very handsome number of Shorthorns and Leicesters.

We have variety in Elgin county. Shorthorns with Archibald Brown, of Iona, who uses "Baron Constance," 37563, from J. Gibson, of Ilderton, and Leicesters from Simon Beattie, the well-known importer. William Woodham, of St. Thomas, is one of the few patronizers of Lincoln sheep, and Rock Bailey, of Union, is as special, in possessing over two hundred head of what he calls American Merino. I should like very much to have a thorough examination of those sheep, in order to ascertain whether, under Ontario conditions, there is as much money with them as by any of our Downs.

Monck has one breeder at any-rate, and a good one—John Jackson, of Abingdon,

with a few Shorthorns, is an old breeder of Southdowns. Beginning in 1862 with drafts from Shepherd, Renton, and Ash, he is now deep in imported material from Sandringham, and Henry Webb, of England, and should be second to nothing in Ontario.

Bothwell, per John Blue, of Duart, is a breeder of Ayrshire cattle, evidently under judicious management, where also is a small flock of Southdowns.

In Lambton, the Cotswold sheep have an unusually old patron. Henry McGurk, of Colinville, began those long wools in 1856 from F. Dorchester, of Middlesex, and is now up to time with others from the Snells, of Brampton.

Far west in Essex we come upon a choice herd of Shorthorns belonging to S. White, of Windsor, with the "6th Duke of Vinewood," 32444, a pure Bates bull.

Middlesex, if true to name, should be field agriculture and not so much live stock—garden more than grazing—by English type. But time may be wanting. Precedence by age gives us a start with J. S. Smith, of Maple Lodge. In 1854 he had England's early maturer of mutton, and can speak of families from Miller, Beattie, Smith, of Edmonton, and Patty, of Hensell, and also of Parkinson, Guelph. "Sixth Earl of Goodness," [8515] 32529, and thirty females must make a Shorthorn herd of some worth, and altogether a farm of an interesting kind. James Graham, of Ailsa Craig, has Lincoln and Shorthorn of 1865 and 1869, respectively. The stock bull is "Elvina's Oxford," 38768, and ram from John Henderson, of Lobo. In 1866, Richard Eady, of Granton started a flock of Lincolns, and still believes in England's heaviest mutton. We have apparently in this county, the centre of Lincoln belief, as again Thos. Nicholson & Sons, of Sylvan, patronize to a very considerable extent, along with Bow Park Shorthorns, both of seventeen years standing. An energetic and business farmer is E. J. Yorke, of Wardsville. Beginning in 1869 he took to what is now the Ontario tax-payer in wool and mutton—the Southdown—choosing in these days from the Rev. J. T. Wright and H. E. Irking, and now the Ontario Experimental Farm. Eight years afterwards Mr. Yorke established a herd of Shorthorns, and still holds a few animals.

One of our far-seeing and active professional buyers and sellers lives at a place called Ilderton, Middlesex. Well-known in England and the United States—Richard Gibson has a fine eye for quality and character among all his Shorthorn transactions, and though a young man, comparatively, has done a great deal for our national status thus-wise. He is one of those who does one thing well—cattle alone, not sheepalso. John Morgan & Sons, of Kerwood, are among the Cotswolds and Durhams also, and prize takers at your 1881 exhibition. Shorthorns appear to be in good repute with C. A. O'Malley at Wardsville, where over thirty head, with other valuable stock, make up an interesting exhibit. "Mazurka Duke" [5703], 16523, is at present in use.

We make a particularly good closing for the west with the Geary Bros., of London, whose exhibit reminds us, in a measure, of that of Mr. Whitfield, Quebec. Aberdeen Polls, Herefords, Lincolns, and Shrops—in all 316 head. The Polls are from herds of well-known Scotch merit—Ballindalloch, and Gavenwood; the Herefords from C. B. Littlewood, W. Meredith, and E. Instone, of England. It must be the wish of every patriotic Canadian that the enterprize of these gentlemen be responded to on the part of our own people, and that we hear less than we have done of such valuable stock leaving the country.

We have yet some notices to overtake in the midland-south portions of the Province, and these very briefly.

C. S. Messacar, of Scotland, Brant, is not only a breeder of Herefords, as already stated, but possesses a large and important herd of Shorthorns, and flocks of Leicesters and Southdowns. Daniel Perley, of Paris, goes back to 1852 with a large flock of Southdown of English "Webb" and Stone, Guelph, pedigree. We took note of Wm. Douglass, of Onondaga, and now make his herd of Shorthorns up to seventy as begun in 1855, and a Leicester flock of six score that was started in 1846. "Earl of Goodness 5th," [8514] 32519, from Bow Park is now the stock bull. Mr. F. W. Smith, of Scotland, though recently among the Herefords has not left the Shorthorns. Thos. Shaw, of Woodburn, a gentleman otherwise of growing importance among cattlemen, holds "Prince Hopewell" [7656], among a select number of Shorthorn cows, and has besides a large flock of Leicesters. An Ayrshire herd, with services from Guy, of Oshawa, belongs to C. W. Ware, of

Hamilton,—twenty head in two years is a handsome beginning. Otherwise, the county of Wentworth is strong in Ayrshires, and much could be said of the excellent herds belonging to James McCormick, of Rockton ; Joseph Cline, of Hamilton, and John Carroll, of St. Catharines. St. Catharines has William Ash, old, as previously mentioned, in sheep work, and Frank Wyatt, with Durhams, Leicesters, Cotswolds, and Southdowns.

PRESENT POSITION OF ONTARIO IN REGARD TO THOROUGH-BRED CATTLE AND SHEEP.

It is not a matter of doubt, in any country, civilized or otherwise, that its live stock interest should be fifty per cent. of its agriculture. Take an average of the extremes of age, population and wealth, as existing at the present moment, in the case of Britain and Canada. Every day of her life, for the last ten years, England has been educating her farmers to the fact that, even in their comparatively very small area, more attention must be paid to the production of beef and mutton than to grain. This is not, by any means, the natural issue of what is called their bad times, but purely a line of work recognized by their best men as indispensable to progress, as well as more independence. Of course, in this instance, independence implies a self-defence, by producing within themselves, as much as possible, of the main necessaries of life.

The present position of Ontario, in this relation, is peculiar: She imports pure breeds from other countries ; some of these are retained, others are handed over to our neighbours and even a few are returned to their original source ; those that are retained are not widely scattered within the Province, but largely in sections, and in the hands of a few. It is plain, then, that the country is not yet fully awake to her duty in this fifty per cent. By fifty per cent., I mean this: Ontario ploughs—under rotation of crops—10,000,000 acres, on which, for the ordinary purposes of cultivation, including implements, horses, and common cows, there is an investment of only $20 per acre. There are sixty per cent. of our farmers—not including those still building homes in newer townships,—who take no interest in improved live stock, who are content with the good living they do make by growing and selling grain and fodder, and consequently their actual investment in the land is comparatively little—little, in comparison to those who maintain cattle and sheep, for the purpose of conserving the crops, maintaining fertility, and securing extra profits. These $20 per acre should just be doubled by investment in live stock by those, as we have said, who have had time to settle down to national duties—the duty of conserving all our energies towards progress and permanency. The number of such farmers in our Province is at least 50,000, or one-half, who hold an average of 150 acres each under cultivation,—three-fourths of the whole cultivated area.

By the recent work of our Bureau of Industries, we are now in possession of what is undoubtedly very correct, as regards *total* in number of live stock. For sake of reference, take the following, from August returns of the present year:

CATTLE:		
Common milch cows		680,652
Working oxen		14,245
		694,897
Other cattle, young calves, &c.		617,001
		1,311,898
Store cattle, over two years		272,861
		1,584,759
Pure breeds		23,297
Total cattle in Province		1,608,056
SHEEP:		
Total		1,942,780

I see no reason to doubt the total numbers of cattle and sheep, but there is no such number as 23,000 thoroughbred cattle in Ontario. From the returns obtained by myself—making a specialty of the case—there are evidently not more than 13,000. It is well known that farmers are very inaccurate—not purposely—in distinguishing exactly between a high graded animal and a thoroughbred, so that the official statistics cannot be held responsible for the distinction.

Now, with these and my own figures, how does the Province stand? Ten million acres growing food for man and beast; possibly one hundred thousand farms holding 1,608,000 cattle, and say 2,000,000 sheep, of all kinds. Actually, then, 16 head of cattle per farm of 100 acres; a very handsome representation indeed; most creditable to the country, because most other countries think themselves well when showing one cattle beast to every ten acres.

We start with the important and comfortable fact that, Ontario is well up in numbers of common cattle; that she has all the field required for beef and milk; but field is one thing, purity to give value is another, and an indispensable one. How many of the 272,000 store cattle, over two years old, now on hand, hold one cross of a thoroughbred bull of any kind?—not one-tenth of them. At the present moment, there are, certainly, not 1,500 pure bred bulls in the whole land, or one to every 7,000 acres, or among fifty farmers. Is this private interest and national duty? Is it not a sad reflection on our enterprise that, for every 1,000 head of grade cattle we possess, but one pure bred, male or female, and that a very large proportion of these are allowed to be drafted out of the Province.

Altogether, therefore, the 50,000 farmers, who should be in possession of improved stock, to an additional, let us say $10 in place of $20 per acre, are keeping back the Province to a serious extent—an annual *interest* equal to $6,000,000.

Other countries will be particularly surprised at the great disproportion between the cattle and sheep of Ontario. For any country to have nearly as many cattle as sheep, is unusual, indeed so much so, that it may be questioned whether another example like ours can be found. I submitted reasons for this, in my address at your annual meeting, in Kingston, in these words: "A forest country, an arable country, a grain-growing one, oxen for working, cows for milk, and the greater suitability of beef for human food, and for winter keep."

But, we are no longer babies in any of the science and practice of farming, and Ontario must be up and doing, in regard to mutton and wool, as much as in beef and grain. To be well up does not mean many, or any, more common sheep than now on hand, because there are about 20 head to each farm of 100 acres. With these as a base of operations, by use of the proper kinds of thoroughbred rams there is a wide enough field; but what agencies have we for such a purpose? Only 2,000 rams and 7,000 ewes pure bred of all classes, and some of the classes are not wanted; but grant these, and we have one ram to every fifty farmers; one to every thousand grade ewes. This gives us a painful idea of the utter unconcern of our people.

I have the honour to be, gentlemen,

Your obedient servant,

W. Brown.

Ontario Agricultural College, November, 1882.

LIST OF PRIZES AWARDED AT THE GRAND DOMINION AND THIRTY-SEVENTH PROVINCIAL EXHIBITION OF THE AGRICULTURAL AND ARTS ASSOCIATION OF ONTARIO, AT KINGSTON, SEPTEMBER 18TH TO 23RD, 1882.

HORSES.

Special Dominion Prize.

Best Stallion on the Ground, Irrespective of Breed or Age.

Awarded to Geo. Cockburn, Baltimore, for "Black Knight," Clydesdale horse, class 5, sec. 1,.....Dominion Gold Medal

Class 1.—Thoroughbred Horses.

6 Entries.

Judges.—Wm. A. Clark, Barrie; John Clark, Ottawa; W. Miller, Napanee.

Best stallion, 4 years old and upwards, "War Cry," Potter & Williams, Napanee.....$30 00
Best stallion, any age, Potter & Williams .....Dom. Silver Medal

Class 2.—Roadster Horses for Driving or the Saddle.

76 Entries.

Judges.—John Clark, Ottawa; Wm. A. Clark, Barrie; W. Miller, Napanee.

Best stallion, 4 years old and upwards, T. Claney, Howe Island.....$35 00
2nd do, R. Scriven, Collins Bay 25 00
3rd do, H. W. Lockwood, Westport 15 00
Best stallion, 3 years old, G. Jones, Trenton. 25 00
2nd do, W. H. Reid, Kingston..... 15 00
Best stallion, 2 years old, J. Bingham, M.D., Cataraque 20 00
Best yearling stallion colt, J. P. Lake & Sons, Morven..... 10 00
2nd do, E. W. & G. Charlton, Duncrief..... 7 00
Best stallion, any age, G. Jones, Trenton.....Dom. Silver Medal
Best three-year-old filly or gelding, A. Vanalstine, Battersea 16 00
2nd do, J. Johnston, Odessa..... 10 00
3rd do, E. W. & G. Charlton..... 6 00
Best two-year-old filly or gelding, S. K. Miller, Bath 12 00
2nd do, W. R. Dorn, Napanee..... 5 00
Best yearling filly or gelding, W. Wellborn, Kingston 8 00
2nd do, J. Johnston..... 6 00
3rd do, C. N. Spooner, Glenburnie 4 00
Best brood mare, with foal by her side, W. Wellborn 6 00
Best foal of 1882, E. W. & G. Charlton..... 8 00
2nd do, W. Wellborn 6 00
Best pair matched horses (stallions excluded) in harness, J. Gibbard & Son, Napanee .....Dom. Gold Medal
2nd do, O. T. Pruyn, Napanee.....$15 00
3rd do, Hugh G. Milling, Napanee..... 10 00
Best single horse (stallion excluded) in harness, John Carson, Kingston.....Dom. Silver Medal and 10 00
2nd do, Thos. Trimble, Napanee..... 12 00
3rd do, T. Gurren, Sandhurst..... 8 00

Class 3.—Carriage Horses—Animals 3 Years Old and Upwards, to be over 15½ hands.

142 Entries.

Judges.—Major R. Howden, Millbrook; Chas. Rowe, Prescott; Chas. O'Neail, Paris.

Best stallion, 4 years old and upwards, J. Irving, Cass Bridge.....$35 00
2nd do, Potter & Williams, Napanee..... 25 00
3rd do, Cunningham & Bro., Trenton..... 15 00
Best stallion, 3 years old, J. E. Lawlor, Dartmouth, Halifax, N.S..... 20 00
Best stallion, 2 years old, D. Malvin, West Winchester..... 20 00
2nd do, W. Lockwood, Wilton..... 12 00
3rd do, W. R. Dorn, Napanee 6 00
Best yearling colt, J. P. Lake & Sons, Morven 10 00
Best stallion, of any age, J. Irving, Cass Bridge.....Dom. Silver Medal
Best filly or gelding, 3 years old, J. Johnston, Odessa..... 16 00
2nd do, S. K. Miller, Bath..... 10 00
Best filly or gelding, 2 years old, George E. Gordanier, Morven..... 12 00
2nd do, C. N. Spooner, Glenburnie..... 7 00
Best yearling filly or gelding, J. Johnston, Odessa..... 8 00
2nd do, C. N. Spooner..... 6 00
3rd do, T. & A. B. Snider, German Mills.... 4 00
Best brood mare, with foal by her side, E. W. & G. Charlton, Duncrief....Dom. Gold Medal and 15 00
2nd do, R. Spooner, Glenburnie..... 12 00
Best foal of 1882, R. Spooner..... 8 00
Best pair matched carriage horses (stallions excluded) in harness, J. W. Russell, Ottawa .....Dom. Gold Medal
2nd do, J. Irving, Cass Bridge..... 15 00
3rd do, Major C. J. Short, Kingston 10 00
Best pair matched carriage horses (stallions excluded) under 15½ hands, in harness, J. W. Munn & Co., Brockville..Dom. Gold Medal
2nd do, John Forth, Glen Buell..... 12 00
3rd do, R. J. Graham, Belleville..... 8 00
Best single carriage horse (stallion excluded), in harness, T. Trimble, Napanee .....Dom. Silver Medal and 10 00
2nd do, G. Jones, sr., Bloomfield..... 12 00
3rd do, J. A. G. Caton, Morven..... 8 00
Best saddle horse (stallion excluded), not over 16 hand, Dean Lyster, Kingston .....Dom. Silver Medal and 10 00
2nd do. S. Madden, Napanee..... 12 00

Best hunter, in saddle, over hurdles, Major C. J. Short, Kingston .....Dom. Silver Medal
EXTRAS.—Pony, under 14½ hands, H. A. Bolton, Stella..... .....Highly commended

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CLASS 4.—HORSES FOR AGRICULTURAL PURPOSES, EXCLUSIVE OF PURE CLYDESDALES, PERCHERONS, AND SUFFOLKS.

59 ENTRIES.

JUDGES.—John Cross, Prescott; John Thompson, Ottawa; John Ferguson, Thamesville; A. McGregor.

Best stallion, 4 years and upwards, W. Sadler, Galt	$35 00
2nd do, S. S. Dickson, Cedar Hill	25 00
3rd do, W. P. Maitland, Brewer's Mills	15 00
Best stallion, 3 years old, S. S. Dickson, Cedar Hill	20 00
2nd do, Moses Spafford, Spaffordton	12 00
Best stallion, 2 years old, T. & A. B. Snider, German Mills	20 00
2nd do, T. & A. B. Snider	12 00
Best filly or gelding, 2 years old, T. & A. B. Snider	12 00
2nd do, W. R. Doran, Napanee	8 00
Best yearling, filly or gelding, T. & A. B. Snider	8 00
2nd do, T. & A. B. Snider	6 00
Best brood mare with foal by her side, G. Cockburn, Baltimore	20 00
2nd do, S. K. Miller, Bath	12 00
Best foal of 1882, G. Cockburn, Baltimore	8 00
2nd do, S. K. Miller, Bath	6 00
Best matched farm team (geldings or mares) in harness, T. & A. B. Snider	.....Dom. Silver Medal and 20 00
2nd do, P. Goodfriend, Howe Island	15 00
3rd do, Major C. J. Short, Kingston	10 00
Best stallion, for agricultural purposes, of any age, W. Sadler, Galt	.....Dom. Gold Medal

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CLASS 5.—CLYDESDALE HEAVY DRAUGHT HORSES, IMPORTED OR BRED FROM PURE IMPORTED HEAVY DRAUGHT STOCK ON THE SIDE OF BOTH SIRE AND DAM.

40 ENTRIES.

JUDGES.—John D. Moore, Galt; E. W. Charlton, Duncrief; Benj. Storey, Picton.

Best heavy draught stallion, 4 years old and upwards, "Viceroy" (891), R. & H. Beith, Bowmanville	$40 00
2nd do, "Black Knight," G. Cockburn	25 00
Best stallion, 2 years old, "Pride of Perth," R. & H. Beith, Bowmanville	20 00
2nd do, "Portland," Jeffrey Brothers, Whitby	12 00
3rd do, "Speedwell," R. & H. Beith	6 00
Best yearling colt, "Strathbogie," J. Miller, Brougham	10 00
2nd do, "Ardgowan," R. & H. Beith	7 00
3rd do., "Young Scotch Lad" [2], H. McCaugherty, Pittsferry	4 00
Best heavy draught stallion, any age, "Viceroy" (891) R. & H. Beith	....Dom. Gold Medal
Best filly, 3 years old, "Bloom of Craigwillie," J. Miller, Brougham	16 00
2nd do, "Maggie," Jeffrey Brothers, Whitby	10 00
Best filly, 2 years old, "Village Rose," J. Miller, Brougham	12 00
Best yearling filly, "Nettie 2nd," J. Miller	8 00
Best 3 females, any age, Jeffrey Brothers	.....Dom. Silver Medal
Best span of heavy draught horses (geldings or mares) in harness, "Dandy" and "Topsy," Jeffery Brothers. Dom. Silver Medal and	$20 00

CLASS 6.—SUFFOLKS, HEAVY DRAUGHT HORSES, IMPORTED OR BRED FROM PURE IMPORTED HEAVY DRAUGHT STOCK ON THE SIDE OF BOTH SIRE AND DAM.

4 ENTRIES.

JUDGES.—John D. Moore, Galt; E. W. Charlton, Duncrief; Benj. Storey, Picton.

Best stallion, 3 years old and upwards, W. Sadler, Galt	$20 00
2nd do, F. W. Stone, Guelph	10 00
Best stallion, any age, W. Sadler. Dom. Silver Medal	

CLASS 7.—PERCHERONS, HEAVY DRAUGHT HORSES, IMPORTED OR BRED FROM PURE IMPORTED HEAVY DRAUGHT STOCK ON THE SIDE OF BOTH SIRE AND DAM.

21 ENTRIES.

JUDGES.—John D. Moore, Galt; E. W. Charlton, Duncrief; Benj. Storey, Picton.

Best stallion, 3 years old and upwards, B. Morden, Rossmore	$20 00
2nd do, T. & A. B. Snider, German Mills	10 00
Best stallion, 2 years old, J. Christy, Bloomfield	10 00
Best yearling colt, J. Christy	10 00
Best stallion, any age, B. Morden. Dom. Silver Medal	
Best female, of any age, T. & A. B. Snider, German Mills	....Dom. Silver Medal and 10 00
2nd do, J. Christy, Bloomfield	10 00

CATTLE.

CLASS 8.—DURHAMS.

137 ENTRIES.

JUDGES.—J. M. Joness, Bowmanville; Jabez Bethel, Port Dalhousie; Thos. Hamilton, Chesterville.

Best bull, 4 years old and upwards, "Barmpton Hero" [6595], J. & W. Watt, Salem	$40 00
2nd do, "Duke of thol" [4962], J. & R. McQueen, Salem	30 00
Best bull, 3 years ld, "Baron of Waterloo" [6613], H. & . Groff, Elmira	40 00
2nd do, "Prince I nest" [7651], D. B. Booth, Odessa	30 00
Best bull, 2 years old "Waterloo Warder" [696 reg., vol. 7], J. C. Snell, Edmonton	40 00
2nd do, "Master Hill" [8974], H. B. Rathbun, Deseronto	30 00
3rd do, "Scotland's Pride" [701 reg., vol. 7], J. & W. Watt	20 00
Best bull, 1 year old, "Prince James" [803 reg., vol. 7], J. Fothergill, Burlington	25 00
2nd do, "Duke of Glenallan" [1382 reg.], J. Haig, Gananoque	20 00
3rd do, "Crown of Elmwood" [8290], J. M. Fair, Kingston	15 00
Best bull calf, under 1 year, "Governor" [697 reg., vol. 7], J. & W. Watt, Salem	20 00

2nd do, "MacDuff" [700 reg., vol 7], J. & W. Watt $15 00
3rd do, "Crusade 2nd" [782 reg., vol. 7], H. & J. Groff 10 00
Best bull of any age, "Barmpton Hero"[6595], J. & W. Watt. Salem .....Dom. Gold Medal
Best cow, "Matchless of Kinellar 2nd," p. 364, vol. 4, J. & J. Watt, Salem..... 30 00
2nd do, "Duchess of Waterloo," (vol. 5, p. 393), H. & J. Groff, Elmira..... 22 00
3rd do, "Crimson Flower 2nd," (vol. 3, p. 407). J. & W. Watt, Salem... ..... 15 00
Best cow, 3 years old, "Princess Louise," p. 392, vol. 5, H. & J. Groff 25 00
2nd do, "Matchless of Elmhurst 2nd," p. 334, vol. 5, J. & W. Watt..... 20 00
3rd, "Lady Ann" [896 reg., vol. 7], H. &. J. Groff 15 00
Best heifer, 2 years old, "Lady Graceful" [898 reg., vol. 7], H. & J. Groff..... 20 00
2nd do, "Rose of Fairview" [vol. 6], J. & W. Watt 15 00
3rd do, "Belle 2nd" [902 reg., vol. 7], H. & J. Groff 10 00
Best heifer, 1 year old, "Lady Booth" [897 reg., vol. 7], H. & J. Groff..... 16 00
2nd do, "Belle 2nd" [902 reg. vol. 7], W. J. Pettit, Burlington..... 12 00
3rd do, "Rose of Allandale" [743 reg., vol. 7], J. & W. Watt, Salem..... ... ... 8 00
Best heifer calf, under 1 year, "Roan Duchess" [854 reg. vol. 7], H. & J. Groff 16 00
2nd do, "Red Rose of Waterloo 2nd" [853 reg. vol. 7], H. & J. Groff..... 12 00
3rd do, "Rosa Lee" [757 reg., vol. 7], J. & W. Watt..... 8 00
Best female, of any age, "Lady Ann" [896 reg. vol. 7], H. & J. Groff...Dom. Silver Medal
Five females, any age, "Duchess of Waterloo," "Princess Louise," "Lady Lorne," "Roan Duchess," "Red Rose of Waterloo," bred and owned by the exhibitor, H. & J. Groff, Elmira, Dom. Silver Medal and set of Canada Short Horn .....Herd Books 5 vols.
Five calves, under 1 year old, bred and owned by the exhibitor, J. & W. Watt, Salem Dom. Silver Medal and set of Canada ..... Short Horn Herd Books, 5 vols.
Herd of Durham cattle, consisting of one bull and five females, of any age, owned by the exhibitor, H. &. J. Groff, Elmira Dom. Gold Medal and set of Canada .....Short Horn Herd Books, 5 vols.

Class 9.—Herfords.

76 Entries.

Judges.—Christopher Barker, Paris; John Forth, Brockville; Wm. Stafford, Lyn.

Best bull, 4 years old and upwards "Regent" (5332), F. W. Stone, Guelph $33 00
2nd do, "Duke of Manchester" (5308), F. W. Stone..... 20 00
Best bull, 3 years old, "Quebec" (6125), F. W. Stone 30 00
2nd do, "Blair 2nd" (5739), F. W. Stone.... 20 00
Best bull, 2 years old, "Bonnie Lad 2nd" (5764), M. Boyd, Bobcaygeon 20 00
2nd do, "Victor 5th" (6246), F. W. Stone,... 15 00
Best bull, 1 year old, "Bonnie Lad 4th" (6317), F. W. Stone $20 00
2nd do, "Sergeant" (imp.), C. C. Brydges, Shanty Bay..... 15 00
Best bull calf, under 1 year, "Beefy Will" (imp.) in dam, C. C. Brydges, Shanty Bay 15 00
2nd do, "Picture 6th," F. W. Stone..... ... 10 00
Best bull of any age, F. W. Stone, ...Dom. Silver Medal
Best cow, "Susie 2nd" (imp), C. C. Brydges 20 00
2nd do, "Vesta 9th," F. W. Stone 15 00
Best cow, 3 years old, "Merry 3rd" (imp.), [37], C. C. Brydges 20 00
2nd do., "Lady Mary 3rd" (imp.), C. C. Brydges 15 00
Best heifer, 2 years old, "Violet 11th" (imp.), [40], C. C. Brydges..... 15 00
2nd do, "Graceful 22nd," F. W. Stone..... 10 00
Best heifer, 1 year old, "Grace 4th" (imp.), [36], C. C. Brydges..... 12 00
2nd do, "Graceful 26th," F. W. Stone..... 8 00
Best heifer calf, under 1 year, "Little Annie" (imp.), C. C. Brydges. 12 00
2nd do, "Graceful 30th," F. W. Stone..... 8 00
Best Female of any age, C. C. Brydges, ... Dom. Silver Medal
Best herd of Herefords, consisting of 1 bull and 5 females, of any age or ages, C. C. Brydges .....Dom. Gold Medal

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Class 10.—Devons.

56 Entries.

Judges.—P. T. Wood, Guelph; John Bennett, Athol; Wm. Brockie, Paisley.

Best bull, 4 years old and upwards, "Count of St. Cesaire," George Whitfield, Rougemont, Que. 30 00
2nd do, 3 years old, "Lord Lorne" [816], G. &. A. Wood, Islington 30 00
Best bull, 2 years old, "John A" [842] W. Courtice, Courtice..... ..... 20 00
Best bull, 1 year old, "Daisy's Duke," Geo. Whitfield, ... 20 00
2nd do, "Sir Walter" [843], G. & A. Wood, Islington 15 00
Best bull of any age, "Count of St. Cesaire," Geo. Whitfield.....Dom. Silver Medal
Best cow, "Moss Rose" [711], G. & A. Wood 20 00
2nd do, "Her Grace," George Whitfield..... 15 00
Best cow, 3 years old, "Maggie May" [769], G. & A. Wood 20 00
2nd do, George Whitfield 15 00
Best heifer, 2 years old, "Buttercup," [815], G. &. A. Wood 15 00
2nd do, "Duchess 3rd," (5270), George Whitfield.... .... 10 00
Best heifer, 1 year old, George Whitfield 12 00
2nd do, "Olivette" [846], G. & A. Wood..... 8 00
Best heifer calf, under 1 year, "Dominion Beauty" [844], G. & A. Wood 12 00
2nd do., "Lady Lorne" [845], G. & A. Wood 8 00
Best Female, any age, G. & A. Wood, ... Dom. Silver Medal
Best herd of Devon cattle, consisting of 1 bull and 5 females, of any age or ages, George Whitfield, Rougemont, Que. .Dom. Gold Medal

Class 11.—Ayrshires.

90 Entries.

Judges.—John Foott, Port Hope; John Pratt, Cobourg; James Findley, Beachburg.

Best bull, 4 years old and upwards, "Carrick Lad" [58 Reg., vol. 2], Jos. Youill, Carleton Place $35 00
Best bull, 3 years old, "Sultan" [60 reg., vol. 2], T. Guy & Son, Oshawa. 35 00
Best bull, 2 years old, "William Wallace" [19, vol. 2], T. Guy & Son 30 00
2nd do, "Colonel 2nd" [174, vol. 2], W. H. McNish, Lyn 20 00
3rd do, "Sir Walter 2nd" [171, vol. 2], Benjamin Storey Picton 10 00
Best bull, 1 year old, "Sir Garnet," [180], T. Guy & Son, ... 20 00
2nd do, "Royal Jack" [90, vol. 2], J. Youill, 15 00
3rd do, "Spring Lad" [97, vol. 2], D. Nicol, Cataraqui 10 00
Best bull calf, under 1 year, "Garfield" [133, vol. 2], E. W. Ware, Hamilton 20 00
2nd do, "Marmion" [182], T. Guy & Son, Oshawa 15 00
3rd do, "Wolsley" [181], T. Guy & Son, ... 10 00
Best bull of any age, [60 reg., vol. 2], T. Guy & Son ..... Dom. Silver Medal
Best cow, "Gurta" [1179 reg.], T. Guy & Son 25 00
2nd do, "Model" [1181 reg.], T. Guy & Son.. 20 00
3rd do, "Dora" [1148 reg.], D. Nicol, Cataraqui 15 00
Best cow, 3 years old, "Rosebud" [145, vol. 2], T. Guy & Son 25 00
2nd do, "Marion" [65, vol. 2], D. Nicol 20 00
3rd do, "Alice" [62, vol. 2], D. Nicol 12 00
Best heifer, 2 years old, "Pansy 2nd" [144, vol. 2], T. Guy & Son 20 00
2nd do, "Belle of Sydenham" [142, vol 2], T. Guy & Son 15 00
3rd do, "Brisby" [78, vol 2], D. Nicol 10 00
Best heifer, 1 year old, "Gurta 5th" [137, vol. 2], T. Guy & Son 15 00
2nd do, "Model 2nd" [146, vol. 2], T. Guy & Son 10 00
3rd do, "Model 3rd" [147, vol. 2], T. Guy & Son 8 00
Best heifer calf, under 1 year, "Gurta 5th" [273], T. Guy & Son..... 10 00
2nd do, "Petunia" [243, vol. 2] J. Youill..... 8 00
3rd do, "Lady Belle," [274], T. Guy & Son.. 5 00
Female of any age, "Gurta 4th," [1181], T. Guy & Son..... Dom. Silver Medal
Herd of Ayrshire cattle, consisting of 1 bull and 5 females, of any age or ages, T. Guy & Son ..... Dom. Gold Medal

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Class 12.—Galloways.

43 Entries.

Judges.—Alex. E. Goodfellow, Guelph; P. R. Palmer, Belleville; Robt. Cleland, Russell; J. G. Snell, Edmonton; James Nimmo, Guelph.

Best bull, 3 years old, "Sam of Garliestown" (imp.), [555], (1610), Thomas McCrae, Guelph $30 00
2nd do, "Autumn" (imp.), [549], (1698), Thomas McCrae, Guelph. 20 00
Best bull, 2 years old, "Premier of Lairdlaugh" (1629), G. Whitfield, Rougemont, Que.. 20 00
2nd do, "Lofty of Waterside" (imp.), [554], T. McCrae 15 00
Best bull, 1 year old, "McLeod 2nd of Drumlanrig" (imp.), [553], (1676), T. McCrae..$20 00
2nd do, "Elrig" (imp.), [551], T. McCrae.... 15 00
Best bull calf, under 1 year, "Arabi Bey" (imp.), [548], T. McCrae 15 00
2nd do, "Clansman," G. Whitfield, ... 10 00
Best bull, of any age, "Premier of Lairdlaugh" (1629), G. Whitfield ..... Dom. Silver Medal
Best cow, "Beauty 2nd of Troynhain" (imp.), [536], (3517), T. McCrae, Guelph..... 20 00
2nd do, "Lucetta" (imp.), [569], (3441), T. McCrae..... 10 00
Best cow, 3 years old, "Ella of Chapelhill" (3699), George Whitfield..... 20 00
2nd do, "Violet of Chapelhill," (3671), George Whitfield 15 00
Best heifer, 2 years old, "Daisy 2nd, of Tarbreoch," George Whitfield 15 00
2nd do, "Jane Seton 3rd" (imp.), [566], T. McCrae..... 10 00
Best heifer, 1 year old, "Nancy Lee 2nd" (imp.), [579], T. McCrae..... 12 00
2nd do, "Nancy of Tarbreoch" (imp.), [580], T. McCrae..... 8 00
Best female of any age, "Beauty 2nd of Troynhaine" (imp.), [556], (3517), T. McCrae ..... Dom. Silver Medal
Best herd of Galloway cattle, consisting of 1 bull and 5 females, of any age or ages, T. McCrae..... Dom. Gold Medal

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Class. 13.—Jersey or Alderney Cattle.

59 Entries.

Judges.—W. G. Baldwin, Colchester; D. Duncan Don; John Grant, Rougemont, Que.

Note by Judges.—*To the Agricultural and Arts Association:*—We, the Judges, beg to report on the Jersey cattle exhibited in this class, and looking at the excellent display, and growing interest displayed by the visitors, would respectfully recommend that they be put upon an equality with other cattle in your next prize list.

Best bull, 3 years old and upwards, "Rival," 3762, Mrs. E. M. Jones, Brockville $20 00
2nd do, H. B. Rathbun, Deseronto..... 15 00
Best Bull, 2 years old, "Le Breve," 5604, V. E. Fuller, Hamilton..... 15 00
2nd do, "Oaklands Rex," 6839, V. E. Fuller, Hamilton..... 8 00
Best yearling bull, H. B. Rathbun, Deseronto 10 00
2nd do, "Bolivot," (imp.), T. Guy & Son, Oshawa 5 00
Best bull of any age, "Le Breeve" [56 A.], V. E. Fuller ..... Dom. Silver Medal
Best cow, 3 years old and upwards, "Flora of St. Peters" 8622, Mrs. E. M. Jones..... 15 00
2nd do, "Rose of Eden," 13437, V. E. Fuller, 10 00
Best heifer, 2 years old, "Cottage Plume," Mrs. Jones..... 10 00
2nd do, "Sweet Clover," 16378, V. E. Fuller 6 00
Best yearling heifer, "Rioter's Ruth," 14882, V. E. Fuller 8 00
2nd do, "Eugenie's Calf," Mrs. Jones..... 5 00
Best female of any age, "Flora of St. Peters" 8622, Mrs. E. M. Jones... Dom. Silver Medal
Best herd of Jersey or Alderney cattle, consisting of 1 bull and 4 females, of any age or ages, V. E. Fuller..... Gold Medal

CLASS 14.—ANGUS OR POLLED ABERDEENS.

27 ENTRIES.

JUDGES.—Alex. E. Goodfellow, Guelph; P. R. Palmer, Belleville; Robert Cleland, Russell; J. G. Snell, Edmonton; James Nimmo, Guelph.

Best bull, 3 years and upwards, "Judge" (1150), G. Whitfield, Rougemont, Que...$30 00
2nd do, "Highland Chief" (1590), G. Whitfield..... 20 00
Best bull, 2 years old, "Rougemont," G. Whitfield..... 20 00
Best yearling bull, "Scott," G. Whitfield.... 20 00
2nd do, "Rio," G. Whitfield..... 15 00
Best bull of any age, "Judge" (1150), G. Whitfield.....Dom. Silver Medal
Best cow, 3 years old and upwards, "Rose Blossom" (4173), G. Whitfield..... 20 00
2nd do, "Caroline 2nd of Kildrumey" (3418), M. Boyd, Bobcaygeon..... 15 00
Best heifer, 2 years old, "Miss Emily," G. Whitfield..... 15 00
2nd do, "Maid of the Spey," G. Whitfield... 10 00
Best heifer, 1 year old, "Lady Abingdon" (vol. 7), M. Boyd..... 12 00
2nd do, "Maggie of Balhagard," T. McCrae, Guelph..... 8 00
Best heifer calf, under 1 year, "Kate 9th," T. McCrae..... 12 00
Best female of any age, "Rose Blossom" (4173), G. Whitfield.....Dom. Silver Medal
Best herd of Angus or Polled Aberdeen cattle, consisting of 1 bull and 3 females of any age, G. Whitfield.....Dom. Gold Medal

CLASS 16.—GRADE CATTLE.

JUDGES.—Wm. Boulton, Atherly; John Ferguson, Monkland; John Isaac, Bomanton.

Best grade cow, H. & J. Groff, Elmira.....$30 00
2nd do, H. & J. Groff..... 20 00
3rd do, H. & J. Groff..... 15 00
Best cow, 3 years old, H. & J. Groff..... 25 00
2nd do, H. & J. Groff..... 20 00
3rd do, H. & J. Groff..... 15 00
Best heifer, 2 years old, H. & J. Groff..... 20 00
2nd do, H. & J. Groff..... 15 00
3rd do, D. B. Booth, Odessa..... 10 00
Best heifer, 1 year old, John Fothergill, Burlington..... 15 00
2nd do, H. & J. Groff..... 10 00
3rd do, Donald B. Booth..... 5 00
Best heifer calf under one year, H. & J. Groff 12 00
2nd do, H. & J. Groff..... 8 00
Best 5 females of any age, the property of the exhibitor, H. & J. Groff, ...Dom. Silver Medal and 20 00

DOMINION SPECIAL PRIZE.

For best cow of any breed for milking purposes. 11 ENTRIES.

The Committee to whom was referred the duty of reporting upon the cows entered for the "Dominion Special Prize for the best cow of any breed for milking purposes," "quantity and quality of milk to be considered," beg leave leave to report:

First: That of the eleven entries made only five presented themselves for competition, although all of the animals entered except one were on the ground.

Second: That the record of those which presented themselves were as follows:—

No. of Entry.	Name of Exhibitor.	Weight of Pail.	Quantities of Milk.				Total Milk in two Milkings.	Percentage of Cream.	Prizes.
			1st milk.		2d milk.		Lbs.		
2	H. Rankin.....	2¾	20¾	18	14¾	12	30	17 per cent.	$30, 1st Prize.
3	T. Guy & Son.....	3¾	20	16¼	19	15¼	31½	12 "	$10, 3rd "
4	do.	2½	20¼	17¾	17¼	14¾	32½	11 "	
5	do.	3¼	20¾	17½	16	12¾	30¼	14 "	$20 2nd "
11	P. E. & W. E. Ward	3	22½	19½	....	....	.....	14 "	
	Average of four cows.....						31 lbs.		

By the foregoing table it will be observed that number eleven was only milked once. This was caused by the exhibitor milking his cow just before the animals were called into the ring for the second milking, and thereby unfortunately necessitating the ruling out of that milking. Although not taken into account in awarding the prizes, the committee think it well to state that number two was a Shorthorn grade which had been milking for a little over five months, while numbers three, four and five were pure-bred Ayrshires, all of which had dropped their calves within the last six weeks, and in this respect had a considerable advantage over number two. Number eleven, which led in quantity in

the morning milking, had only dropped her calf about two weeks ago, and was a grade, and had her exhibitor not acted as he did, would no doubt have come out second.

JOHN CARNEGIE,
L. B. ARNOLD,
D. P. McKINNON,
LIONEL E. SHIPLEY.

PRINCE OF WALES' ANNUAL PRIZE FOR THE BEST HERD OF FAT CATTLE FOR SHIPPING.

2 ENTRIES.

JUDGES.—G. F. Frankland, Toronto; John I. Hobson, Mosborough; A. E. Goodfellow, Guelph.

Prize awarded to H. & J. Groff, Elmira..... .....$60 00

To the Secretary of Provincial Exhibition.

The following is the statement of the cattle competing for the Prince of Wales' prize:

First: Canadian Champion, light roan, 40 months old, weighs 2,600 lbs., is a Shorthorn grade of two crosses of Booth blood.

Second: King of the West, pure white, 43 months old, weighs 2,500 lbs., a thorough bred Shorthorn of Booth family.

Third: Doctor, red and white, 31 months old, weighing 1,900 lbs., Shorthorn grade of two crosses of the Booth family.

Our system of feeding is as follows. When a calf is dropped, the cow is allowed to stay in the stable with it for the first four or five days. After this age, for the first month the calf is allowed to suck three times a day, but after the expiration of one month, only twice a day. We allow all our calves to suck until they are four months old, and sometimes let a choice calf suck six months. When cows are on pasture while suckling, we generally give each cow half a gallon of bran each morning and night. This is continued until about the middle or end of July, or as long as the pastures are good and the weather cool, but when the pastures become poor, the weather hot, and the flies troublesome, we keep them in a darkened stable during the day, but allow them to run out in the fields at night. When kept in the stable during the day they are fed on cut straw or clean wheat chaff, to which is added bran, a few boiled peas, a little flax seed, and Thorley's Cattle Food. For twenty head of grown cattle, when on grass at night, they give ten bushels of chaff, thirty gallons of bran, one bushel of well boiled peas, one pint of flax seed boiled with the peas. In preparing the above food for use, the chaff or cut straw and bran is put in a large feed box, then the boiled peas and flax seed, with the liquid in which they were boiled, is added hot from the furnace. As soon as one meal is fed the feed is prepared for the next. The box is covered over as soon as the feed is well mixed, and all the steam kept in. In feeding calves a quantity of this feed is given suitable to their age. The above food is given three times a day, and, as soon as it is eaten at morning and noon, as much cut green corn is fed as each animal will eat up clean—no green food is given at night, for when the cattle have eaten their evening meal of steamed food, they are turned into the pasture. Whenever it is noticed that an animal does not eat well the quantity of food given is diminished. Never give more than the beast will eat at the time, and always keep food boxes clean; this is essential to success in feeding. Occasionally sprinkle a little salt in the boxes or troughs after feeding, and always sprinkle salt on the boiled feed. For winter treatment, the warm mixed feed is continued, but a little more is given, and in place of pasture and cut green corn, hay and cured corn stalks, cut up with pea straw in equal proportions, are fed. This pea straw and corn stalk is prepared and fed as mixed warm feed. We also feed a few turnips to each beast, but do not believe in giving too many cold roots in winter, considering the warm mixed feed much better, especially the boiled peas. We give our aged cattle about three pecks of turnips per day; to our fattening cattle we give about one gallon of pea meal per day, mixed with the mixed feed, and divided into three meals. We fatten off our cattle between two and three years, and hold that all cattle should be sold to the butcher by the time they are three, in order to give the farmer the best results.

The above is our method of feeding cattle over two years. As before stated, we allow our calves to suck from four to six months, generally letting the dam suckle her own calf, but in cases where it is desirable to dry the dam for any reason, another cow is procured and the calf allowed to suck her, and the dam milked for a short time until she is dried. We have found it preferable to keep the calves in the stable during the first summer. We think it advisable because the calves learn to eat much sooner and better, they grow faster, and do not worry the cows or themselves nearly as much, and are protected from the heat and flies, which we think very important. As soon as the calves can be induced to eat, which is at about six weeks old, they are fed with a little bran and oats at first, as much as they will eat at a time, and as soon as they begin to eat well, bran and boiled peas with a little Thorley Food, are fed three times a day, never feeding more than they will eat clean at a time, but always as much as they will eat. Before the grass or green feed comes in a little hay is given, clover hay being preferred, and, if it is the season of the year when roots are fed, we give to each calf a few cut fine, twice a day. But as soon as green food can be obtained it takes the place of hay and roots, and is fed three times a day. Clover hay coming in first is fed in the early summer, then American corn, which is always cut up in a straw cutter and fed as turnips, in a trough. The calves are always allowed to run loose in a box stall, being careful to keep those of an age and size together, so that all get their share, for, if large and small were allowed to run together, the large ones would thrive at the expense of the smaller. Plenty of fresh water must be supplied, three times a day during the summer and twice a day during the winter. This treatment is continued until the beginning of second summer, or until they are twelve or sixteen months old, after which time they get the same treatment as the aged and breeding cattle. The breeding cattle are let out of stable each day during the winter just long enough to drink, and returned to the stable, but the fat cattle have water carried to them. This is done for the purpose of keeping them quiet and warm, and it is found to pay. They think in all cases it pays better to keep an animal growing from the time of birth to maturity, and no time to stint it of feed or water.

While we lay great stress on proper and plentiful feeding, we also consider good ventilation, warm and cleanly kept stables, and gentle treatment of vital importance. We never allow a dog in the yard or stable, nor persons employed to be noisy or rough when amongst or near our cattle. Nor do we allow our animals to become dirty; all are curried or brushed at least twice a week during the winter, but we prefer it done daily if possible.

Cost of feeding for last six (6) months was thirty-six dollars ($36) per head, or about six dollars ($6) a month for each head.

H. & J. Groff.

Elmira, Waterloo County, Ontario.

Class 17.—Fat and Working Cattle, any breed.

40 Entries.

Judges.—G. F. Frankland, Toronto; John I. Hobson, Mosborough.

Note by Judges.—We would like to remark in reference to the enormously large and fat cattle shown here, that while they are noble animals to look at, and show well what can be done by high breeding and liberal feeding, yet it may be questioned whether they are profitable for either the breeder or exporter, but would be rather inclined to think that animals such as were fed at the Ontario Agricultural College Farm, and exhibited at this exhibition, the best animals for the export trade.

Best four fat cattle, under 4 years, H. & J. Groff, Elmira.....Dom. Gold Medal
Best fat ox or steer, any age, H. & J. Groff .....Dom. Silver Medal
Best fat cow or heifer, any age, H. Young, Guelph .....Dom. Silver Medal
Best fat ox or steer, 4 years old and over, H. & J. Groff $30 00
2nd do, H. & J. Groff 20 00
3rd do, H. & J. Groff 10 00
Best fat steer, under 4 years, H. & J. Groff.. 30 00
2nd do, H. & J. Groff 20 00
3rd do, H. & J. Groff 10 00
Best fat cow and heifer, 4 years old and over. H. Young. 30 00
2nd do, H. & J. Groff 20 00
Best fat cow and heifer, under 4 years, H. & J. Groff..... 30 00
2nd do, W. Whitelaw, Guelph..... 20 00
3rd do, H. & J. Groff 10 00
Best yoke of working oxen, Andw. McCallum, Sunbury 8 00
Best fat steer or heifer, under 3 years, H. & J. Groff 20 00
2nd do, H. & J. Groff 15 00
3rd do, H. & J. Groff 10 00

FARMERS' ADVOCATE PRIZE OF $100, GIVEN BY WILLIAM WELD OF LONDON, ONTARIO, "FOR THE BEST HERD OF FIVE COWS FOR GENERAL PURPOSES AND PROFIT."

4 ENTRIES.

JUDGES.—W. G. Baldwin, Colchester; Joseph Youill, Carleton Place; J. G. Snell, Edmonton.

Prize awarded to Thomas Guy & Son, Oshawa.

To HENRY WADE, ESQ.,

Secretary Agricultural and Arts Association, Kingston.

SIR,—In presenting the following statement for the consideration of the Judges appointed to award the prize given by the liberal editor of the *Farmers' Advocate*, we wish to state that we kept no regular daily account of the produce of our cows, but we frequently have tested their yield of milk by weight.

We find our best milk cows, when they first conceive, give from forty to fifty pounds of milk per day, and in some circumstances to exceed that quantity, on grass alone. We think, therefore, from this that we may safely estimate their average yield for the first three weeks after calving at thirty-five pounds per day; for the next three months at twenty-five pounds, and for the third three month at twenty pounds per day, or an average yield for nine months or 270 days of twenty-seven pounds per day, making an aggregate of 7,290 pounds of milk as the product of each cow for the year.

This quantity, if sold at three cents per quart, would realize $109.35. Four of those cows produced calves, which, from actual sales at three months old, made $50 each, which, added to the amount from milk, gives $159.35 as the product of each cow.

The same quantity of milk if manufactured into cheese, allowing ten pounds of milk to a pound of cheese, the figures would stand thus: 7,290 pounds of milk, or 729 pounds of cheese, @ 9c. = $65.61 Add to this the value of whey, say $4; calf, $50. Total, $119.61.

If made into butter, supposing twenty-four pounds of milk gave one pound of butter, gives 303¾ pounds, which an average of eighteen cents per pound amounts to $54.66. To this add value of buttermilk and skim milk, say $10 for the year, also calf, $50. Total, $114.66.

The above result gives $4.85 less per cow for the year than that produced from cheese, and $44.69 less than the milk.

In giving an account of the management, cost and keep, &c., we would say that upon the approach of winter we stable our cattle at nights and also on stormy days, but, generally, in winter they have the run of the barn-yard, with a supply of fodder and water during the day. On coming into their stalls in the evening each animal is allowed half a bushel of turnips or mangolds, and the same in the morning, with hay at nights and a feed of chop, such as ground oats and peas with bran. We find this requisite to keep up the supply of milk.

We estimate the cost as follows for the six winter months:

190 days, 1 bushel of roots per day @ 5c.	$ 9 50
2,500 lbs. hay @ $8.00 per ton	10 00
½ ton bran or its equivalent in chop	5 00
Pasture in summer	8 00
Cost of calf to three months old	10 00
	$ 42 50
	5
Cost of keep of five cows for the year	$212 50
Leaving a balance in favour, from the herd:	
From the milk product @ 3c. per quart	$583 25
" cheese @ 9c	385 55
" butter @ 18c	367 50

We would further state that herd shown by us are all pure Ayrshires, bred by ourselves, that, in addition to their milking qualities, they are of good size, and when not in milk, if so desired, are easily fattened and converted into beef. That the beef of an Ayrshire animal is finer grained, better intermixed with lean, more juicy and palatable than that of other cattle, especially those of the larger breeds. That it has been found also by actual tests that the milk of an Ayrshire is richer in casein or cheese producing qualities, giving a much larger percentage of curd to a given quantity of milk than that of any other. They are also more easily obtained, as they are not held at such extravagant and fancy prices as some others, and therefore better adapted to the wants of the general public, as they are within the reach of any farmer of moderate means, rendering a quick and remunerative return for a given amount of outlay. That the herd we exhibit are all good breeders, having had calves regularly every year since they were two years old, and two of them in 1880 dropped twins. That three of the herd are in full milk at the present time, and the other two are due to calve in about a month. That they are all sound in every respect, easily kept, docile and good specimens of their kind, having received first honours in their respective sections at previous Provincial and other exhibitions, and, in addition to this, one of their number was awarded the prize of twenty dollars, offered by Mr. Lockie at the late Industrial Exhibition at Toronto, for the best milch cow of any kind.

All of which is respectfully submitted.

T. Guy & Son.

Sydenham Farm, Oshawa, Sept. 16th, 1881.

Extra Entries of Animals.

23 Entries.

W. H. Montray, Stella, for she ass, age 10 or 12 years, and she ass colt, 1 year old	$5 00
Jos. H. Chant, Eginburg, for pair imported Shetland mares	5 00
George Whitfield, Rougemont, Que., for exhibit of "Sussex" and "West Highland"	Dom. Gold Medal
Do. for Polled grade cattle	Diploma

SHEEP.

Long Woolled.

Class 18.—Cotswolds.

49 Entries.

Judges.—James Craig, Derwent; James Park, Oriel; Andrew Wilson, Appleton.

Best ram, 2 shears and not over 5 shears, H. Arkell, Arkell	$20 00
2nd do, J. Main, Boyne	15 00
3rd do, F. W. Stone, Guelph	10 00
Best shearling ram, J. Main	20 00
2nd do, Jas. Main	15 00
3rd do, F. W. Stone	10 00
Best ram lamb, J. Main	15 00
2nd do, P. Arkell, Teeswater	12 00
3rd do, H. Arkell	10 00
Best two ewes, 2 shears and not over 7 shears, H. Arkell	16 00
2nd do, J. Main	12 00
Best two shearling ewes, H. Arkell	16 00
2nd do, H. Arkell	12 00
3rd do, J. Main	8 00
Best two ewe lambs, J. Main	$15 00
2nd do, J. Main	12 00
3rd do, H. Arkell	10 00
4th do, H. Arkell	6 00
Best pen of Cotswolds, 1 ram not over 5 shears, 3 ewes, 2 shears and not over 7 shears, 3 shearling ewes, and 3 ewe lambs, H. Arkell	Dom. Silver Medal and 10 00

Class 19.—Leicesters.

75 Entries.

Judges.—Henry Collins, Peterboro'; P. McLaren, South Finch; John Ross, Cookstown.

Best ram, 2 shears and not over 5 shears, A. Murray, Clanbrassil	$20 00
2nd do, W. Whitelaw, Guelph	15 00
3rd do, H. Hammond, Cainsville	10 00
Best shearling ram, J. Kelly, jr., Shakespeare	20 00
2nd do, Jno. Kelly, jr., Shakespeare	15 00
3rd do, A. Murray	10 00
Best ram lamb, W. Walker, Ilderton	15 00
2nd, W. Whitelaw	12 00
3rd do, W. Whitelaw	10 00
4th do, A. Murray	6 00
Best two ewes, 2 shears and not over 7 shears, J. Kelly, jr.	16 00
2nd do, J. Kelly, jr.	12 00
3rd do, W. Whitelaw	8 00
Best two shearling ewes, J. Kelly, jr.	16 00
2nd do, W. Whitelaw	12 00
3rd do, J. Kelly, jr.	8 00
Best two ewe lambs, J. Kelly, jr.	15 00
2nd do, J. Kelly, jr.	12 00
3rd do, W. Whitelaw	8 00
4th do, J. Kelly, jr.	6 00
Best pen of Leicesters, 1 ram not over 5 shears, 3 ewes, 3 shears and not over 7 shears, 3 shearling ewes, and 3 ewe lambs, John Kelly, jr.	Dom. Silver Medal and 10 00

Pen of Leicesters, 1 ram not over 5 shears, 3 ewes, 2 shears and not over 7 shears, 3 shearling ewes, and 3 ewe lambs, Canadian bred, W. Whitelaw, Dom. Silver Medal and $10 00

Class 20.—Lincolns.

53 Entries.

Judges.—A. B. Cowan, Galt; R. G. Murphy, Elgin.

Best ram, 2 shears and not over 5 shears, W. Walker, Ilderton $20 00
2nd do, E. Parkinson, Eramosa 15 00
3rd do, A Tamblyn, Orono 10 00
Best shearling ram, E. Parkinson 20 00
2nd do, E. Parkinson 15 00
3rd do, W. Walker 10 00
Best ram lamb, A. Tamblyn 15 00
2nd do, W. Walker 12 00
3rd do, A. Tamblyn 10 00
Best two ewes, 2 shears and not over 7 shears, W. Walker 16 00
2nd do, W. Walker 12 00
3rd do, A. Tamblyn 8 00
Best two shearling ewes, A. Tamblyn 16 00
2nd do, W. Walker 12 00
3rd do, E. Parkinson 8 00
Best two ewe lambs, E. Parkinson 15 00
2nd do, A. Tamblyn 12 00
3rd do, A. Murray 8 00
Best pen of Lincolns, 1 ram not over 5 shears, 3 ewes, 2 shears and not over 7 shears, 3 shearling ewes, and 3 ewe lambs, W. Walker ..... Dom. Silver Medal and 10 00

Medium Woolled.

Class 21.—Southdowns.

80 Entries.

Judges.—F. Van de Bogart, Napanee; Frank Wyatt, St. Catharines.

Best ram, 2 shears and not over 5 shears, R. Marsh, Richmond Hill $20 00
2nd do, J. Jackson, Abingdon 15 00
3rd do, John Jackson 10 00
Best shearling ram, T. Wilkinson, Renton station 20 00
2nd do, R. Marsh 15 00
3rd do, J. Jackson 10 00
Best ram lamb, T. Wilkinson 15 00
2nd do, J. Jackson 12 00
3rd do, J. Jackson 10 00
Best two ewes, 2 shears and not over 7 shears, R. Marsh 16 00
2nd do, J. Jackson 12 00
3rd do, R. Marsh 8 00
Best two shearling ewes, T. Wilkinson 16 00
2nd do, R. Marsh 12 00
3rd do, J. Jackson, Abingdon 8 00
Best two ewe lambs, T. Wilkinson, Renton Station 15 00
2nd do, J. Jackson, Abingdon 12 00
3rd do, J. Jackson 8 00
Best pen of Southdowns, 1 ram, not over 5 shears, 3 ewes, 2 shears and not over 7 shears, 3 shearling ewes, and 3 ewe lambs, T. Wilkinson, Renton Station ..... Dom. Silver Medal and 10 00

Class 22.—Shropshire, Hampshire, and Oxfordshire Downs.

45 Entries.

Judges.—Edward Marsh, Halloway; A. R. McGregor, Sarnia; Wm. Rivers, Walkerton.

Best ram, 2 shears and not over 5 shears, P. Arkell, Teeswater $20 00
2nd do, S. K. Miller, Bath 10 00
Best shearling ram, P. Arkell 20 00
2nd do, H. Arkell, Arkell 10 00
Best ram lamb, P. Arkell 10 00
2nd do, H. Arkell 6 00
Best two ewes, 2 shears and not over 7 shears, P. Arkell 18 00
2nd do, H. Arkell 10 00
Best two shearling ewes, H. Arkell 18 00
2nd do, Peter Arkell 10 00
Best two ewe lambs, P. Arkell 10 00
2nd do, H. Arkell 6 00
Best pen of Shropshire, Hampshire, and Oxford Downs, 1 ram, not over 5 shears, 3 ewes, 2 shears and not over 7 shears, 3 shearling ewes, and 3 ewe lambs, P. Arkell, Teeswater. Dom. Silver Medal and 10 00

Class 23.—Merinos.

32 Entries.

Judges.—Edward Marsh, Halloway; A. R. McGregor, Sarnia; Wm. Rivers, Walkerton.

Best ram, 2 shears and over, Mrs. M. N. Hood, Guelph $10 00
2nd do, J. Simpson, Cataraqui 5 00
Best shearling ram, J. Simpson 8 00
Best ram lamb, J. Simpson 6 00
2nd do, J. Simpson 3 00
Best two ewes, 2 shears and over, J. Simpson. 8 00
2nd do, J. Simpson 4 00
Best two shearling ewes, J. Simpson 6 00
Best two ewe lambs, J. Simpson 6 00
2nd do, W. M. Smith, Fairfield Plains 3 00
Best pen of Merinos, 1 ram, not over 5 shears, 3 ewes, 2 shears and not over 7 shears, 3 shearling ewes, and 3 ewe lambs, J. Simpson, Cataraque ..... Dom. Silver Medal

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Class 24.—Fat Sheep.

20 Entries.

Judges.—G. F. Frankland, Toronto; John I. Hobson, Mosborough.

The Judges report as follows on class 24, sec. 4:—Four fat sheep. These are four remarkably fine sheep. They are bred from a common Canadian ewe and an Oxford Down ram. This way of crossing produces a sheep exceptionally well suited for exportation, being fuller of lean than the ordinary sheep, and for that reason takes well in the British markets.

Best two fat wethers, 2 shears and over, Mrs. M. N. Hood, Guelph $12 00
2nd do, Mrs. M. N. Hood 8 00
Two fat wethers under 2 shears, J. C. Evans, Hespeler 12 00
2nd do, Mrs. M. N. Hood 8 00

Two fat ewes, 2 shears and over, Mrs. M. N. Hood $12 00
2nd do, H. Hammond, Cainsville 8 00
3rd do, H. Hammond 4 00
Four fat sheep, any age, not exhibited in any other section, Mrs. M. N. Hood ..... Dom. Silver Medal

PIGS.

Small Breeds.

Class 25.—Improved Berkshires.

93 Entries.

Judges.—John Sangster, Lancaster; T. A. Kidd, Burritt's Rapids; Hiram. A. McCrea, Merrickville.

Best boar, over two years, J. G. Snell, Edmonton $15 00
2nd do, J. Hewer, Guelph 10 00
3rd do, J. Hewer 5 00
Best boar, over 1 year and under 2 years, J. G. Snell 15 00
2nd do, W. R. Dorn, Napanee 10 00
3rd do, R. C. McDonald, Cataraqui 5 00
Best boar, over 6 months and under 12 months, J. G. Snell 15 00
2nd do, J. G. Snell 10 00
Best boar, under 6 months, W. H. McNish, Lyn 12 00
2nd do, J. G. Snell 8 00
3rd do, J. G. Snell 4 00
Best boar, any age, Canadian bred, J. Hewer, ... Dom. Bronze Medal
Best sow, over 2 years, W. A. McNish 15 00
2nd do, J. G. Snell 10 00
3rd do, J. Hewer 5 00
Best sow, over 1 year and under 2 years, J. G. Snell 15 00
2nd do, J. G. Snell 10 00
3rd do, S. Shaw, Kingston 5 00
Best sow, over 6 months and under 12 months, J. G. Snell 15 00
2nd do, J. Hewer 10 00
3rd do, J. G. Snell 5 00
Best sow, under 6 months, W. H. McNish 12 00
2nd do, J. G. Snell 8 00
3rd do, P. Arkell 6 00
Best sow, any age, Canadian bred, W. H. McNish ..... Dom. Bronze Medal
Best Berkshire boar and 2 sows of any age, J. G. Snell ..... Dom. Silver Medal

Class 26.—Suffolks.

115 Entries.

Judges.—John Kemp, Hazeldean; Wm. Switzer, New Lowell; Luther Cheyne, Brampton.

Best boar, over 2 years, Dorsey and McClure, Sommerville $15 00
2nd do, J. Featherstone, Credit 10 00
3rd do, Dorsey & McClure 5 00
Best boar, over 1 year old and under 2 years, Dorsey & McClure 15 00
2nd do, J. Main 10 00
3rd do, G. & A. Wood, Islington 5 00
Best boar, over 6 months and under 15 months, J. Main 15 00
2nd do, Dorsey & McClure 10 00
3rd do, A. Frank & Sons, The Grange 5 00
Best boar, under 6 months, Dorsey & McClure $12 00
2nd do, Dorsey & McClure 8 00
3rd do, J. Main 4 00
Best boar, any age, Canadian bred, Dorsey & McClure ..... Dom. Bronze Medal
Best sow, over 2 years, Dorsey & McClure 15 00
2nd do, Jas. Main 10 00
3rd do, A. Frank & Sons 5 00
Best sow, over 1 year and under 2 years, Dorsey & McClure 15 00
2nd do, J. Main 10 00
3rd do, Dorsey & McClure 5 00
Best sow, over 6 months and under 12 months, J. Main 15 00
2nd do, Dorsey & McClure 10 00
3rd do, Dorsey & McClure 5 00
Best sow, under 6 months, J. Main 12 00
2nd do, J. Main 8 00
3rd do, Dorsey & McClure 5 00
Best sow, any age, Canadian bred, Dorsey & McClure ..... Dom. Bronze Medal
Best Suffolk boar and two sows, any age, Jas. Main ..... Dom. Silver Medal

Class 27.—Poland China.

18 Entries.

Judges.—James Craig, Dumblane; Geo. Cairns, Virgil; S. Butterfield, Sandwich.

Best boar, over 2 years, W. G. Baldwin, Colchester $15 00
Best boar, over 1 and under 2 years, J. Featherstone, Credit 15 00
2nd do, W. G. Baldwin 10 00
Best boar, over 6 months and under 12, W. G. Baldwin 15 00
2nd do, W. G. Baldwin 10 00
Best boar, under 6 months, W. G. Baldwin 12 00
2nd do, W. G. Baldwin 8 00
Best boar, any age, Canadian bred, W. G. Baldwin ..... Dom. Bronze Medal
Best sow, over 2 years, W. G. Baldwin 15 00
Best sow, over 1 and under 2 years, W. G. Baldwin 15 00
2nd do, W. G. Baldwin 10 00
Best sow, over 6 months and under 12, W. G. Baldwin 15 00
2nd do, W. G. Baldwin 10 00
Best sow, under 6 months, W. G. Baldwin 12 00
2nd do, W. G. Baldwin 8 00
Best sow, any age, Canadian bred, W. G. Baldwin ..... Dom. Bronze Medal
Best boar and 2 sows, any age, W. G. Baldwin ..... Dom. Silver Medal

Class 28.—Essex.

50 Entries.

Judges.—Walter Riddell, Cobourg; James Healey, Strathroy.

Note by Judges.—We have examined the class of Essex Pigs, and find them, on the whole, a very excellent exhibit.

Best boar, over 2 years, J. Featherston, Credit. $15 00
2nd do, J. Featherston 10 00
Best boar, over 1 year and under 2, J. Featherston 15 00
2nd do, G. & A. Wood, Islington 10 00

Best boar, over 6 months and under 12, J. Featherston $15 00
2nd do, J. Featherston 10 00
Best boar, under 6 months, J. Featherston 12 00
2nd do, J. Featherston 8 00
Best boar, any age, Canadian bred, J. Featherston ..... Dom. Bronze Medal
Best sow, over 2 years, J. Featherston 15 00
2nd do, J. Featherston 10 00
Best sow, over 1 year and under 2, J. Featherston 15 00
2nd do, G. & A. Wood 10 00
Best sow, over 6 months and under 12, J. Hewer, Guelph 15 00
2nd do, G. & A. Wood 10 00
Best sow, under 6 months, J. Featherston 12 00
2nd do, J. Featherston 8 00
Best sow, any age, Canadian bred, J. Featherston ..... Dom. Bronze Medal
Best Essex boar and 2 sows, any age, J. Featherston ..... Dom. Silver Medal

Large Breeds.

Class 29.—Yorkshire and other Large Breeds.

67 Entries.

Judges.—N. A. Caton, Napanee; Wm. Dawson, Vittoria; John Thompson, Gananoque.

Best boar, over 2 years, J. Featherston, Credit. $15 00
2nd do, J. Featherston 10 00
Best boar, over 1 year and under 2, J. Featherston 15 00
2nd do, J. Featherston 10 00
3rd do, G. A. Parrott, Odessa 5 00
Best boar, over 6 months and under 12, J. Featherston 15 00
2nd do, H. McCaugherty, Pittsferry 10 00
3rd do, J. Featherston 5 00
Best boar, under 6 months, J. Featherston 12 00
2nd do, J. Featherston 8 00
3rd do, J. Hewer 4 00
Best boar, any age, Canadian bred, J. Featherston ..... Dom. Bronze Metal
Best sow, over 2 years, J. Hewer 15 00
2nd do, J. Featherston 10 00
3rd do, Mrs. C. Truedell, Cataraqui 5 00
Best sow, over 1 year and under 2, J. Featherston 15 00
2nd do, A. Knight, Cataraqui 10 00
Best sow, over 6 months and under 12, J. Featherston 15 00
2nd do, J. Featherston 10 00
Best sow, under 6 months, J. Featherston 12 00
2nd do, J. Hewer 8 00
3rd do, J. Featherston 4 00
Best sow, any age, Canadian bred J. Featherston ..... Dom. Bronze Medal
Best Yorkshire or other large breed, boar and 2 sows, any age, J. Featherston ..... Dom. Silver Medal

POULTRY.

Class 30.—Poultry, etc.

226 Entries.

Judges.—Samuel Wood, Montinette; G. J. Miller, Virgil; W. H. Doel, Donmount.

Best pair Dorkings, white, W. M. Smith, Fairfield Plains $3 00
Best pair Dorkings, silver grey, Jas. Main, Boyne $3 00
2nd do, J. L. Clapp, Belleville 2 00
Best pair Dorkings, coloured, Jas. Main, Boyne 3 00
2nd do, Jas. Main 2 00
3rd do, W. H. Reid, Kingston 1 00
Best pair Polands, white, W. M. Smith, Fairfield Plains 3 00
2nd do, Benjamin Robinson, Kingston 2 00
3rd do, J. L. Clapp 1 00
Best pair Polands, golden, G. H. Pugsley, Brantford 3 00
2nd do, G. H. Pugsley 2 00
3rd do, J. L. Clapp 1 00
Best pair Polands, silver, J. L. Clapp 3 00
2nd do, J. L. Clapp 2 00
Best pair Polands, white crested, black, G. H. Pugsley 3 00
2nd do, G. H. Pugsley 2 00
3rd do, J. L. Clapp 1 00
Best pair Plymouth rock, Butterfield & Hanes, Sandwich 3 00
2nd do, J. L. Clapp 2 00
3rd do, G. H. Pugsley 1 00
Best pair Brahmas, light, Butterfield & Hanes 3 00
2nd do, J. C. Clapp 2 00
3rd do, W. H. Reid 1 00
Best pair Brahmas, dark, Butterfield & Hanes 3 00
2nd do, Butterfield & Hanes 2 00
3rd do, G. H. Pugsley 1 00
Best pair Cochins, buff, Butterfield & Hanes .. 3 00
2nd do, G. H. Pugsley 2 00
3rd do, J. L. Clapp 1 00
Best pair Cochins, white, Butterfield & Hanes 3 00
2nd do, G. H. Pugsley 2 00
3rd do, Butterfield & Hanes 1 00
Best pair Cochins, partridge, Butterfield & Hanes 3 00
2nd do, J. L. Clapp 2 00
3rd do, Butterfield & Hanes 1 00
Best pair Houdons, W. H. Reid 3 00
Best pair Langhams, G. H. Pugsley 3 00
2nd do, G. H. Pugsley 2 00
3rd do, G. H. Pugsley 1 00
Best pair game fowls, black breasted or other reds, Butterfield & Hanes 3 00
2nd do, J. L. Clapp 2 00
3rd do, J. L. Clapp 1 00
Best pair game fowls, duckwing, Butterfield & Hanes 3 00
Best pair game fowls, another variety, Butterfield & Hanes 3 00
2nd do, G. H. Pugsley 2 00
Best pair Leghorns, white, Butterfield & Hanes 3 00
2nd do, J. L. Clapp 2 00
3rd do, G. H. Pugsley 1 00
Best pair Leghorns, brown, J. L. Clapp 3 00
2nd do, J. L. Clapp 2 00
Best pair Spanish fowls, J. L. Clapp 3 00
Best pair Hamburgs, golden pencilled, Butterfield & Hanes 3 00
2nd do, Butterfield & Hanes 2 00
3rd do, G. H. Pugsley 1 00
Best pair Hamburgs, silver pencilled, Butterfield & Hanes 3 00
2nd do, Butterfield & Hanes 2 00
Best pair Hamburgs, golden spangled, G. H. Pugsley 3 00
2nd do, G. H. Pugsley 2 00
3rd do, Butterfield & Hanes 1 00
Best pair Hamburgs, silver spangled, Butterfield & Hanes 3 00
2nd do, Butterfield & Hanes 2 00
3rd do, J. L. Clapp 1 00
Best pair Hamburgs, black, Butterfield & Hanes 3 00
2nd do, Butterfield & Hanes 2 00
3rd do. A. B. Vanblaricorn, Stella 1 00

Best pair Crevecœurs, W. M. Smith, Fairfield Plains $3 00
Best pair bantams, seabright, G. H. Pugsley 3 00
2nd do, G. H. Pugsley 2 00
3rd do, J. L. Clapp 1 00
Best pair bantams, black breasted or other reds, J. M. Reid, Kingston 3 00
2nd do, J. L. Clapp 2 00
3rd do, J. L. Clapp 1 00
Best pair bantams, duckwing game, J. M. Reid 3 00
2nd do, W. H. Reid 2 00
3rd do, James Gunn 1 00
Best pair bantams, any other variety, G. H. Pugsley 3 30
2nd do, G. H. Pugsley 2 00
3rd do, J. M. Reid 1 00
Best pair turkeys, any colour, James Main, Boyne 3 00
2nd do, James Main 2 00
3rd do, J. L. Clapp 1 00
Best pair turkeys, wild, W. H. Reid 3 00
Best pair geese, Bremen, James Main 3 00
2nd do, J. L. Clapp 2 00
3rd do, James Main 1 00
Best pair geese, Toulouse, W. H. Reid 3 00
2nd do, C. Frederick Corbett 2 00
Best pair English geese, grey and common, W. H. Reid 3 00
2nd do, W. H. Reid 2 00
Best pair geese, any other kind, D. G. Fraser, Nortpost 3 00
2nd do, John Hewer, Guelph 2 00
3rd do, J. L. Clapp 1 00
Best pair ducks, Aylesbury, G. H. Pugsley 3 00
2nd do, G. H. Pugsley 2 00
Best pair ducks, Rouen, James Main 3 00
2nd do, J. L. Clapp 2 00
3rd do, James Main 1 00
Best pair ducks, Pekin, J. L. Clapp 3 00
2nd do, G. H. Pugsley 2 00
3rd do, G. H. Pugsley 1 00
Best pair ducks, any other kind, H. M. Smith, 3 00
2nd do, J. M. Reid 2 00
3rd do, J. M. Reid 1 00
Best pair Guinea fowls, W. M. Smith 3 00
2nd do, W. H. Reid 2 00
Best pair pea fowls 3 00
Best pair any other variety of fowls not included in these sections, Butterfield & Hanes 3 00
2nd do, G. H. Pugsley 2 00
3rd do, G. H. Pugsley 1 00
Best collection of poultry apart from all other entries, Butterfield & Hanes. Dom. Bronze Medal

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Class 31.—Chickens, Ducks, &c., 1882.

162 Entries.

Judges.—Wm. Pennock, Elgin; A. McKellar.

Best pair Dorkings, white, Butterfield & Hanes, Sandwich $2 00
Best pair Dorkings, silver grey, Jas. Main, Boyne 2 00
2nd do, Jas. Main 1 00
Best pair Dorkins, coloured, Jas. Main 2 00
2nd do, Jas. Main 1 00
Best pair Polands, golden, G. H. Pugsley 2 00
Best pair Polands, white crested beak, G. H. Pugsley 2 00
Best pair Plymouth rock, Butterfield & Hanes 2 00
2nd do, G. H. Pugsley 1 00
Best pair Brahmas, light, Butterfield & Hanes 2 00
2nd do, G. H. Pugsley 1 00
Best pair Brahams, dark, Butterfield & Hanes $2 00
2nd do, Butterfield & Hanes 1 00
Best pair Cochins, buff, Butterfield & Hanes. 2 00
2nd do, J. L. Clapp 1 00
Best pair Cochins, white, Butterfield & Hanes 2 00
2nd do, Butterfield & Hanes 1 00
Best pair Cochins, partridge, Butterfield & Hanes 2 00
2nd do, G. H. Pugsley 1 00
Best pair Langhams, G. H. Pugsley 2 00
Best pair game fowls, black breasted and other reds, Butterfield & Hanes 2 00
2nd do, J. L. Clapp 1 00
Best pair game fowls, duckwing, Butterfield & Hanes 2 00
2nd do, Butterfield & Hanes 1 00
Best pair Leghorns, white, Butterfield & Hanes 2 00
2nd do. G. H. Pugsley 1 00
Best pair Spanish fowls, J. L. Clapp 2 00
Best pair Hamburgs, golden-pencilled, Butterfield & Hanes 2 00
Best pair Hamburgs, silver-pencilled, Butterfield & Hanes 2 00
Best pair Hamburgs, golden-spangled, Butterfield & Hanes 2 00
Best pair Hamburgs, silver-spangled, Butterfield & Hanes 2 00
2nd do, G. H. Pugsley 1 00
Best pair Hamburgs, black, Butterfield & Hanes 2 00
2nd do, Butterfield & Hanes 1 00
Best pair bantams, seabright, G. H. Pugsley. 2 00
2nd do, Jas. Main 1 00
Best pair bantams, black-breasted or other reds, W. H. Reid 2 00
2nd do, W. H. Reid 1 00
Best pair bantams, duckwing game, W. H. Reid 2 00
2nd do, W. H. Reid 1 00
Best pair bantams, any other variety, G. H. Pugsley 2 00
2nd do, J. M. Reid 1 00
Best pair geese, Bremen, Jas. Main 2 00
2nd do, Jas. Main 1 00
Best pair English geese, grey and common, W. H. Reid 2 00
Best pair geese, any other kind, Geo. Nicol, Cataraqui 2 00
2nd do, D. G. Fraser, Northport 1 00
Best pair ducks, Rouen, Jas. Main 2 00
2nd do., Jas. Main 1 00
Best pair ducks, any other kind, J. L. Clapp. 2 00
Best pair Guinea fowls, Jas. Main 2 00
Best pair any other variety not included in these sections, Butterfield & Hanes 2 00
2nd do, Butterfield & Hanes 1 00

Pigeons.

Best pair carrier pigeons, J. L. Clapp 2 00
2nd do, W. H. Reid 1 00
Best pair pouter pigeons, Geo. Nicol 2 00
2nd do, W. H. Reid 1 00
Best pair tumbler pigeons, W. H. Reid 2 00
2nd do, W. H. Reid 1 00
Best pair Jacobin pigeons, Geo. Nicol 2 00
2nd do., Jas. Gunn 1 00
Best pair fantail pigeons, W. H. Reid 2 00
2nd do, W. H. Reid 1 00
Best pair barb pigeons, Geo. Nicol 2 00
2nd do., J. L. Clapp 1 00
Best pair trumpeter pigeons, W. H. Reid 2 00
2nd do, J. M. Reid 1 00
Best collection of pigeons, any other kind, W. H. Reid ..... Dom. Bronze Medal
2nd do, W. H. Reid 2 00

RABBITS.

Best pair common rabbits, W. H. Reid..... $2 00
2nd do, J. M. Reid..... 1 00

CLASS 33.—AGRICULTURAL IMPLEMENTS.

69 ENTRIES.

The Judges would recommend "That in future Exhibitions chilled-jointed plows be entered in a separate class, as we believe it to be unfair to the xhibitors of such plows, to have to compete with ordinary plows."

JUDGES.—Alex. Baine, Galt; Jas. Hamilton, Glen Huron; Geo. McMillan, Dunbar.

Best gang-plow, Frost & Wood, Smith's Falls. .....Dom. Bronze Medal and $8 00
2nd do, J. E. Cockshutt, Brantford..... 8 00
3rd do, Patterson & Bros., Whitby..... 4 00
Best horse-hoe or single-horse cultivator, iron, J. E. Cockshutt..... 4 00
Best horse-hoe or single-horse cultivator, wood, Frost & Wood 4 00
Best improved liquid manure drill, for drilling two or more rows of liquid with turnips, mangels, etc., either on the ridge or flat, J. W. Mann & Co., Brockville..... 10 00
Best iron-beam plough, with steel mouldboard, and wood handles, Connoly & Son, Yarker..... Dom. Bronze Medal and 10 00
2nd do., Connoly & Son, Yarker 8 00
3rd do, Frost & Wood 4 00
Best pair of iron harrows, J. Maunders, Little Britain..... 8 00
Best potato-digger, Henry Parker, Gananoque, ...Dom. Bronze Medal and 5 00
Best straw-cutter, David Maxwell, Paris 8 00
2nd do, Patterson & Bro., Whitby 6 00
Best subsoil plough, Watson Manufacturing Company, Ayr..Dom. Bronze Medal and 8 00
Best wooden plough, J. E. Cockshutt..... .....Dom. Bronze Medal and 8 00
Best wooden roller, Chown & Cunningham, Kingston 10 00
Best collection of agricultural implements, for field use, Patterson Bros., Patterson..... .....Dom. Bronze Medal

EXTRAS. — Diploma: — Spring-tooth cultivator, wooden frame, on wheels, Patterson Bros., Patterson. Highly Commended:—Grain drill with fertilizer attachment, spring-tooth cultivator, J. O. Wisner, Son & Co., Brantford; prairie-breaker plough (wood beam), prairie stubble plough wood beam, prairie stubble plough (iron beam), Frost & Wood, Smith's Falls; gleaner and binder, Watson Manufacturing Company, Ayr; plaster, salt, and fertilizer sower, spring-tooth harrow, on wheels, sulky plough, garden plough, "chilled," broadcast seed-sower with harrow attachments, J. W. Mann & Company, Brockville; wheeled scraper, steel-drag scraper, railroad barrow, G. Wilkinson & Company, Aurora; corn-husker, H. Sells & Son, Toronto; machine for grinding mower and reaper knives, S. W. Day, Cataraqui; iron-beam ploughs "chilled" mouldboard, one-horse iron beam ploughs "chilled" mouldboards and wood handles, Segmiller & Company, Goderich.

CLASS 34.—CARRIAGES AND SLEIGHS, AND PARTS THEREOF.

196 ENTRIES.

JUDGES.—Robt. Cumming, Cumming's Bridge; Thos. Scott, Newburgh; D. A. Burdett, ———; John R. Marcellus, Dunbar.

Best axle, wrought iron, Warwick & Company, Galt..... $4 00
2nd do., Byers & Company, per J. W. Brown & Company, agents, Kingston 2 00
Best buggy, double seated, covered, G. A. Brown, Belleville 8 00
2nd do, G. W. Robinson, Kingston. 6 00
Best buggy, double seated, uncovered, Gananoque Carriage Works, Gananoque..... 6 00
Best buggy, single seated, covered, G. W. Robinson, Kingston 10 00
2nd do, T. W. McCrea, Kingston..... 8 00
Best buggy, single seated, uncovered, G. W. Robinson, Kingston 6 00
2nd do, T. W. McCrea, Kingston..... 4 00
Best carriage hack, J. W. Brown, Kingston. 10 00
Best carriage, two-horse, pleasure, G. W. Robinson, Kingston 12 00
2nd do, J. W. Brown, Kingston..... 8 00
Best carriage (child's perambulator), J. W. Brown, Kingston..... 3 00
2nd do, G. W. Robinson, Kingston..... 2 00
Best carriage and buggy, woodwork, assortment of, G. W. Robinson, Kingston..... 10 00
2nd do, J. W. Brown, Kingston..... 6 00
Best democrat waggon, Gananoque Carriage Works, Gananoque..... 7 00
2nd do, Warnock & Company, Galt 4 00
Best farm sleigh, G. W. Robinson, Kingston. 8 00
2nd do, J. W. Brown, Kingston..... 4 00
Best horse cart, J. W. Brown, Kingston..... 6 00
Best hubs, carriage, one dozen, Gananoque Carriage Works, Gananoque..... 3 00
2nd do, W. Hore & Son, Hamilton, per G. W. Robinson, agent, Kingston..... 2 00
Best two-horse team waggon, Gananoque Carriage Works, Gananoque ....Dom. Bronze Medal and 8 00
Best phæton, pony, uncovered, G. A. Brown, Belleville..... 6 00
2nd do, G. W. Robinson, Kingston..... 4 00
Best phæton, covered, G. W. Robinson, Kingston 6 00
2nd do, G. A. Brown, Belleville..... 4 00
Best pleasure cutter, G. W. Robinson, Kingston 6 00
2nd do, Gananoque Carriage Works, Gananoque..... 4 00
Best sleigh, two-horse, pleasure, J. W. Brown, Kingston 8 00
2nd do, G. W. Robinson, Kingston..... 6 00
Best sleigh, hack, F. X. Roy, Montreal, per G. W. Robinson, agent, Kingston..... 6 00
2nd do, J. W. Brown & Company, Kingston. 4 00
Best display of vehicles, G. W. Robinson, Kingston..... .....Dom. Bronze Medal
Best spokes, carriage, machine-made, Sage & Company, London, per G. W. Robinson, agent, Kingston..... 3 00
2nd do, Gananoque Carriage Works, Gananoque 2 00
Best springs, one set steel carriage, Warwick & Company, Galt 5 00
2nd do, Guelph Carriage Goods Company, Guelph 3 00
Best one-horse market waggon, Gananoque Carriage Works, Gananoque..... 9 00
2nd do, Warnock & Company, Galt 5 00

Best two-horse spring market waggon, Gananoque Carriage Works, Gananoque....$10 00
2nd do, G. W. Robinson, Kingston..... 7 00
Best wheels, one pair carriage, unpainted, N. G. Olds & Son, Guelph..... 3 00
2nd do, Gananoque Carriage Works, Gananoque 2 00
Best collection of carriage material, Guelph Carriage Goods Company, Guelph.....
.....Dom. Bronze Medal

EXTRAS.—Collection consisting of side bar buggy gear on wheels, side spring buggy gear on wheels, platform spring waggon gear, and assortment of buggy and carriage dashes, McKinnon & Mitchell, St. Catharines; Dom. Silver Medal. Collection consisting of assortment of single plate cast steel carriage and waggon springs, Armstrong's steel buggy gear, buggy with steel gear, buggy with steel gear and Armstrong's patent flange and tyre steel, assortment of buggy-dash moulding, and assortment of Ladd's steel shaft anti-rattlers, Guelph Carriage Goods Company, Guelph; Dom. Silver Medal. Collection consisting of park phæton (uncovered), ladies' phæton (uncovered), dog cart, trotting sulky, trotting sleigh, child's sleigh, cariole, buggy (unpainted), spring seat for waggon, pole springs, patent dash lamps, and folding-seat sleigh, G. W. Robinson, Kingston; Dom. Bronze Medal. For waggon-jack, frame work of phæton, ironwork of buggy, sleigh shafts, and covered sleigh, J. W. Brown & Company, Kingston; Dom. Bronze Medal. For collection of patent wheels, etc., Toronto Patent Wheel and Waggon Company, Toronto; Dom. Bronze Medal and Diploma. Side-bar buggy gears, Gananoque Carriage Works, Gananoque; Diploma. Assortment of gears, Warnock & Company, Galt; Diploma. The following exhibits highly commended:—Large pair of wheels for lifting stumps, etc., W. Power, Kingston; carriage top (not lined), Hodge's patent, Wm. Hodge, Uxbridge; rein holder, Jas. Latherney, Kingston.

CLASS 35.—AGRICULTURAL TOOLS AND IMPLEMENTS, CHIEFLY FOR HAND USE.

16 ENTRIES.

JUDGES.—J. M. Drummond, Keene; W. A. Webster, Landsdowne; Hugh Clark, Brampton.

Best assortment of drain tiles, Jas. Elliott, Cataraqui..... 4 00
Best seed drill, or barrow, for turnips, J. W. Mann & Company, Brockville..... 4 00
Best half-dozen axe handles, Jno. Kelley, Dartford..... 2 00
Best set horse shoes, Thos. Worth, Kingston. 3 00
2nd do, Jas. P. Lake & Sons, Morven..... 2 00
Best apple dryer, A. R. Gayhart, Downeyville.....Dom. Bronze Medal

EXTRAS.—Fruit dryer or evaporator, Lewis Smith, Marion, Wayne County, N. Y.; highly commended.

AGRICULTURAL PRODUCTIONS.

CLASS 36.—FIELD GRAINS, HOPS, ETC.

324 ENTRIES.

JUDGES.—Oliver Jarvis, Simcoe; Geo. Barrie, Galt.

Canada Company's Prize.—Mr. Wm. Tuck reports, That the name of the wheat is the 'Deihl;' it grew on clay loam soil, facing the south-east; was sown on the 3rd of September; harvested the last week in July, and is not more subject to midge than other kinds.

The Canada Company's Prize for the best 25 bushels of fall wheat, the produce of the Province of Ontario, being the growth of 1882. Each sample must be of one distinct variety, pure and unmixed, of the best quality for seed, and not to be tested merely by weight. The prizes to be awarded to the actual grower only of the wheat, which is to be given up to and become the property of the Association, for distribution in the several agricultural districts, for seeds, Wm. Tuck, Waterdown $100 00
2nd do, Stephen Madden, Napanee..... 40 00
Best white winter wheat, 2 bushels, Wm. Tuck, Waterdown..... 10 00
2nd do, Sidney W. Wood, Loughboro'..... 8 00
3rd do, Thos. Keenen, Kingston..... 6 00
4th do, Walter Hartman, Clarksburg..... 4 00
Best red winter wheat, 2 bushels, Wm. Smith, Fairfield Plains 8 00
2nd do, W. J. Baldwin, Colchester..... 6 00
3rd do, Chas. Grant, Thornbury..... 4 00
Best Clawson wheat, 2 bushels, Wm. Pennock, Elgin..... 8 00
2nd do, Wm. Tuck, Waterdown..... 6 00
3rd do, Stephen Madden, Napanee 4 00
4th do, Jno. Wood, Loughboro'..... 2 00
Best Fyfe spring wheat, 2 bushels, Arch'd Knight, Cataraqui..... 8 00
2nd do, W. M. Kennedy, Lintrathen, Man... 6 00
3rd do, Jno. Hay, Clarksburg..... 4 00
Best spring wheat of any other variety, 2 bushels, Chas. Grant, Thornbury..... 8 00
2nd do, Chas. Grant, Thornbury..... 6 00
3rd do, Alex. Ritchie, Inverary..... 4 00
Best barley (2 rowed) 2 bushels, Chas. Grant, Thornbury 6 00
2nd do, Arch'd Knight, Cataraqui..... 4 00
3rd do, John Hoy, Clarksburg..... 2 00
Best barley (6 rowed), 2 bushels, Chas. Grant, Thornbury..... 6 00
2nd do, Sidney W. Wood, Loughboro'..... 4 00
3rd do, Franklin Orser, Picton..... 2 00
Best winter rye, 2 bushels, Sidney W. Wood, Loughboro' 6 00
2nd do, Wm. Pennock, Elgin..... 4 00
Best oats (white), 2 bushels, Stephen Madden, Napanee..... 6 00
2nd do, Sidney W. Wood, Loughboro'..... 4 00
3rd do, Chas. Grant, Thornbury..... 2 00
Best oats (black), 2 bushels, Wm. Pennock, Elgin..... 6 00
2nd do, Chas. Grant, Thornbury..... 4 00
3rd do, Jno. Wood, Loughboro'..... 2 00
Best small field peas (2 bushels), Chas. Scott, Melville Cross..... 6 00
2nd do, Stephen Madden, Napanee..... 4 00
3rd do, Wm. Pennock, Elgin..... 2 00
Best Marrowfat peas, 2 bushels, Chas. Scott, Melville Cross 6 00
2nd do, Chas. Scott, Melville Cross..... 4 00
3rd do, Chas. Grant, Thornbury..... 2 00
Best field peas, 2 bushels of any other kind, Wm. Gould, Kingston..... 6 00
2nd do, Wm. Pennock, Elgin 4 00
3rd do, Chas. Grant, Thornbury..... 2 00
Best small white field beans, bushel, John Crumb, Bowmanville..... 6 00
2nd do, Alfred Crumb, Bowmanville..... 4 00
3rd do, Wm. Gould, Kingston..... 2 00
Best large white field beans, bushel, Robt. Morven, Napanee..... 6 00

2nd Best, Allen Bond, Inverary..... $4 00
3rd do, A. Bridge, West Brook..... 2 00
Best Indian corn in the ear (white), 2 bushels, Henry Lutz, Stony Creek 6 00
2nd do, J. D. Lutz, Stony Creek 4 00
3rd do, Gordanier & Phippen, Morven..... 2 00
Best Indian corn (yellow) 2 bushels, J. D. Lutz, Stony Creek 6 00
2nd do, Henry Lutz, Stony Creek 4 00
3rd do, Stephen Madden, Napanee..... 2 00
Best bale of hops, not less than 160 lbs., N. Sprague, Demorestville 15 00
2nd do, Hugh Young, Prescott..... 10 00
3rd do, G. T. Mabey, Grimsby..... 5 00
Best specimen of the early amber sugar-cane, not less than 20 lbs., Thos. Keenan, Kingston 10 00
2nd do, Alex. Ritchie, Inverary..... 5 00

Extras.—General assortment of all kinds of grain in sheaf and shelled, grown in the State of Nebraska, Ira P. Griswold, Detroit, Mich., U. S.; Diploma. Collection of grain in sheaf, and sheaf of French spring wheat, Chas. Grant, Thornbury; Diploma. For California branch beans, A. D. McKenzie, Maitland; Diploma.

Class 37.—Small Field Seeds, Flax, Hemp, Etc.

90 Entries.

Judges.—M. D. Willard, Morrisburg; R. D. Patterson, Belleville; James Jackson, Mount Charles.

Best timothy seed, bushel Wm. Pennock, Elgin..... 6 00
2nd do, Geo. Lawson, Lintrathen, Man..... 4 00
3rd do, Wm. Lawrence, Loughboro'..... 2 00
Best clover seed, bushel, W. M. Smith, Fairfield Plains 6 00
2nd do, J. L. P. Gordanier, Morven..... 4 00
3rd do, Jas. A. G. Caton, Morven..... 2 00
Best Alsike clover seed, half bushel, W. M. Smith, Fairfield Plains $6 00
Best flax seed, bushel, Walter Hartman, Clarksburg..... 6 00
2nd do, Chas. Grant, Thornbury..... 4 00
3rd do, Geo. Lawson, Linthrathen, Man. ... 2 00
Best Sweedish turnip seed from transplanted bulbs, not less than 12 lbs., John Crumb, Bowmanville..... 4 00
2nd do, Alfred Crumb, Bowmanville..... 3 00
Best grey stone turnip seed, 12 lbs., John Crumb, Bowmanville..... 4 00
2nd do, Alfred Crumb, Bowmanville..... 3 00
Best white Belgian, field carrot seed, 12 lbs., Alfred Crumb, Bowmanville..... 4 00
2nd do, John Crumb, Bowmanville..... 3 00
Best long red mangel-wurzel seed, 12 lbs., Alfred Crumb, Bowmanville..... 4 00
2nd do, John Crumb, Bowmanville..... 3 00
Best yellow globe mangel-wurzel seed, 12 lbs., Alfred Crumb, Bowmanville..... 4 00
2nd do, John Crumb, Bowmanville..... 3 00
Best tares, bushel, Chas. Scott, Melville Cross. 4 00
2nd do, Mrs. Chas. A. Truedell, Cataraqui... 3 00
Best buckwheat, bushel. Sidney W. Wood, Loughboro'..... 4 00
2nd do, Jno. Wood, Loughboro'..... 2 00
Best millet, bushel, W. M. Smith, Fairfield Plains 4 00
2nd do, Chas. Grant, Thornbury..... 2 00
Best Hungarian grass seed, bushel, W. M. Smith, Fairfield Plains..... 4 00
2nd do, Chas. Grant, Thornbury..... 2 00
Best cured tobacco leaf, growth of Canada, 10 lbs., Jno. Friendship, Portsmouth.... 4 00
2nd do, John Wright, Kingston..... 2 00
Best broom corn bush, 28 lbs., Jno. Wright, Kingston..... 3 00
Best sample of any variety of grass, not heretofore cultivated, as a farm crop suitable for winter fodder, and capable of producing, the same year it is sown, two tons or over of dried hay per acre, with statement, Francis Peck, Albury..... 10 00

Albury, September 9, 1882.

To Henry Wade, Esq.,

Secretary Agricultural and Arts Association, Kingston.

Dear Sir,—I bought it, the seed, by the name of Egyptian or Pearl Millet. It is known in Georgia and Florida as Cat-tail Millet, where it is grown for feeding horses and cattle, and also for making sugar and syrup from. The seed is small, like other millets, and slow of growth at first; but when it once gets started rightly its growth is enormous. It is stated that it has produced as high as sixteen tons of dried feed and ninety-five tons of green per acre, in three cuttings in one year. I do not claim so much for it, but on good, rich, clean, moist (not wet) land, I think it would produce 7 or 8 tons of dried feed per acre (one seeding) in two cuttings per season. It may be sown in drills or broadcast, 6 lbs. per acre in drills, or 12 lbs., broadcast, of seed per acre is sufficient. I prefer sowing in drills, about 24 inches apart, and cultivate and hoe once, and after that it will outgrow any weeds and occupy the whole ground. My horses and cattle eat it readily and clean. It has one drawback, and that is that it takes our whole season to mature its seed. It matured last year, but this year it will not ripen good, this season being cold and wet, until the middle of June.

Yours truly,

Francis Peck.

CLASS 38.—FIELD ROOTS, ETC.

300 ENTRIES.

JUDGES.—M. W. Swaze, St. Catharines; S. Fraser, Midland.

Best Climax potatoes, bushel, Francis Peck, Albury	$3 00
Best Snowflake potatoes, bushel, J. M. Fair, Kingston	3 00
2nd do., J. G. Clogg, Cataraqui	2 00
3rd do, Stephen Madden, Napanee	1 00
Best Garnet Chilis, bushels, Chas. Scott, Melville Cross	3 00
2nd do, Francis Peck, Albury	2 00
Best Compton's Surprise potatoes, bushel, Chas. Scott, Melville Cross	3 00
2nd do, Francis Peck, Albury	2 00
Best Early Rose potatoes, bushel, Mrs. Pritchard, Kildonan, Man	3 00
2nd do, John Harker, Sharpton	2 00
3rd do, J. L. P. Gordanier, Morven	1 00
Best Late Rose potatoes, bushel, Jas. A. G. Caton, Morven	3 00
2nd do, Gordanier & Phippen, Morven	2 00
3rd do, Jno. Hewer, Guelph	1 00
Best Hebron potatoes, bushel, J. L. P. Gordanier	3 00
2nd do, Jno. Hewer, Guelph	2 00
3rd do, Arch. Knight, Cataraqui	1 00
Best Brownell's Beauty, bushel, John Hewer, Guelph	3 00
Best Ruby potatoes, bushel, Francis Peck, Albury	3 00
2nd do, Chas. Scott, Melville Cross	2 00
3rd do, W. M. Smith, Fairfield Plains	1 00
Best any other sort of potatoes, bushel, Gordanier & Phippen, Morven	3 00
2nd do, J. G. Clogg, Cataraqui	2 00
3rd do, Stephen Madden, Napanee	1 00
Best Seedling potatoes, J. L. P. Gordanier, Morven	3 00
2nd do, Jno. Hewer, Guelph	2 00
3rd do, Reuben Spooner, Glenburnie	1 00
Best collection of field potatoes, half peck of each sort, named, Reuben Spooner, Glenburnie	6 00
2nd do, Francis Peck, Albury	4 00
3rd do, Robt. Madden, Napanee	2 00
Best eight roots Marshall's Improved Swede turnips, Chas. Scott, Melville Cross	3 00
Best eight roots Carter's Swede turnips, Daniel Rogers, Kingston	3 00
2nd do, Arthur R. Hora, Kingston	2 00
3rd do, Chas. Scott, Melville Cross	1 00
Best eight roots Skirving's Swede turnips, Chas. Scott, Melville Cross	3 00
Best eight roots Shamrock Swede, Chas. Scott, Melville Cross	3 00
Best eight roots Bangholm Swede, Chas. Scott, Melville Cross	3 00
2nd do, Chas. George, Kingston	2 00
Best eight roots Sutton's Champion turnip, Chas. Scott, Melville Cross	3 00
2nd do, Arthur R. Hora, Kingston	2 00
3rd do, Jno. F. Reid, Edinburgh	1 00
Best eight roots Westbury turnips, Chas. Scott, Melville Cross	3 00
Best eight roots White Globe turnips, Chas. Scott, Melville Cross	3 00
2nd do, John Hewer, Guelph	2 00
Best eight roots Greystone turnips, Chas. Scott, Melville Cross	3 00
Best eight roots Aberdeen Yellows, Daniel Rogers, Kingston	3 00
2nd do, John Hewer, Guelph	2 00
3rd do, P. E. & W. E. Ward, Kingston	1 00
Best four varieties turnips, 8 of each, Chas. Scott, Melville Cross	$3 00
Best twelve roots red carrots, Sam'l N. Watts, Portsmouth	3 00
2nd do, Geo. Croft, Portsmouth	2 00
3rd do, Chas. George, Kingston	1 00
Best twelve roots white or Belgian carrots, Sam'l N. Watts, Portsmouth	3 00
2nd do, Geo. Croft, Portsmouth	2 00
3rd do, G. E. Gordanier, Morven	1 00
Best eight roots mangel-wurzel, long red, Jos. Youill, Carleton Place	3 00
2nd do, Gardiner & Phippen, Morven	2 00
3rd do, J. H. Gordan, Cataraqui	1 00
Best eight roots, Red Globe mangel-wurzel, E. Baiden, Portsmouth	3 00
2nd do, Sam'l N. Watts, Portsmouth	2 00
Best eight roots Yellow Globe mangel-worzel, J. H. Gordan, Cataraqui	3 00
2nd do, F. V. Gardiner, Kingston	2 00
3rd do, E. Baiden, Portsmouth	1 00
Best eight roots long yellow mangel-worzel, Sam'l N. Watts, Portsmouth	3 00
Best eight roots Kohl Rabi, Wm. Pennock, Elgin	3 00
2nd do, Chas. Scott, Melville Cross	2 00
3rd do, Chas. George, Kingston	1 00
Best eight roots White Sugar beet, Chas. Scott, Melville Cross	3 00
2nd do, F. V. Gardiner, Kingston	2 00
3rd do, J. Knight, Cataraqui	1 00
Best twelve roots parsnips, Jno. Simpson, Cataraqui	3 00
2nd do, Thos. Friendship, Kingston	2 00
Best twelve roots chicory, Chas. Scott, Melville Cross	3 00
2nd do, Wm. Benham, Guelph	2 00
Best four common yellow field pumpkins, Stephen Madden, Napanee	3 00
2nd do, Edward Cooke, Cataraqui	2 00
For the best and most creditable assortment of field roots, any kind, Chas. Scott, Melville Cross	Dom. Bronze Medal

EXTRAS.—Highly Commended:—Swede turnips, Robt. Vair, Glenburnie; Swede turnips, Jno. Simpson, Cataraqui; tobacco (growing specimen).

DAIRY PRODUCTS, ETC.

CLASS 39.—DAIRY PRODUCTS, ETC.

155 ENTRIES.

JUDGES.—James Barnum, Grafton; John McDonald, Harrison's Corners; Prof. L. B. Arnold, Rochester, N. Y.

Best three firkins of butter, fitted for exportation, not less than 50 lbs. in each firkin, made at any butter factory or creamery, working capacity not less than 100 cows' milk, exhibitors to furnish mode of manufacture, including breed and number of cows, description of factory, treatment of milk, quantity, brand, and make of salt used, and any other practical information that they may be able to afford, before being paid the amount of premium. For exportation.	
1st prize (Dairy), Wm. Graham, Smith's Falls	$25 00
2nd do, Wm. Herbison, Clinton	15 00
1st prize (Creamery), David May, Escott	30 00
2nd do, Alex. Thomson, Caintown	20 00
3rd do, Nith Valley Creamery, Haysville	12 00

Best firkin of butter not less than 50 lbs., in shipping order, manufactured at any private dairy, or creamery, capacity and manufacture not over 50 cows. For exportation.	
1st prize (Dairy), Mrs. D. McNamee, Warburton	$15 00
2nd do, Wm. Graham, Smith's Falls	10 00
3rd do, John Forth, Glen Buell	7 00
4th do, Wm. Lawrence, Loughboro'	4 00
1st prize (Creamery) Nith Valley Creamery, Haysville	20 00
Best butter, not less than 28 lbs., in firkins, crocks, or tubs, "for home use," "home consumption."	
1st prize, Mrs. D. McNamee, Warburton	8 00
2nd do, Wm. Lawrence, Loughboro'	6 00
3rd do, Wm. Graham, Smith's Falls	4 00
4th do, Wm. Herbison, Clinton	2 00
Best butter, not less than 10 lbs., in rolls, prints, or pats, "table use," home consumption, known as 5 day butter.	
1st prize, Hugh Rankin, Collins' Bay	8 00
2nd do, J. G. Clogg, Cataraqui	6 00
3rd do, Alex. Ritchie, Inverary	4 00
4th do, Wm. Graham, Smith's Falls	2 00
Three factory cheese (white), capacity of factory, and manufacture of not less than the milk of 100 cows.	
Best cheese made during the first 15 days in August, 1882.	
1st prize, Jas. Whitton, Wellman's Corners	50 00
2nd do, Thos. Stacey, Bornholm	40 00
3rd do, Robt. Robinson, Tweed	30 00
4th do, Walter Russell, Napanee	20 00
5th do, Wm. Harris, Atwood	15 00
6th do, Geo. Vancott, Canifton	10 00
7th do, Gordanier & Phippen, Morven	5 00
Three factory cheese (coloured), capacity of factory and manufacture of not less than 100 cows' milk cheese made during the first 15 days in August, 1882.	
1st prize, Jas. Whitton, Wellman's Corners	50 00
2nd do, Moses Spafford, Spaffordton	40 00
3rd do, Geo. Noble, Tweed	30 00
4th do, Jas. Bissell, Algonquin	20 00
5th do, Robt. Robinson, Tweed	$15 00
6th do, W. H. Thompson, W. Huntingdon	10 00
7th do, Geo. Vancott, Canifton	5 00
Three dairy cheese, not less than 30 lbs.	
1st prize, W. R. Dorn, Napanee	8 00
2nd do, Geo. Horning, Elginburg	6 00
Three Stilton cheeses, not less than 8lbs. each.	
1st prize, Mrs. Eliza Parsons, Guelph	8 00
Three Gloucester, or Wiltshire Loaf, or Truckle cheese, not less than 8 lbs. each.	
1st prize, Jno. Robinson, Riverbank	8 00
2nd do, Wm. Huxley, Fullarton Corners	6 00
3rd do, Thos. Stacey, Bornholm	4 00
Best collection of butter tubs, for shipping purposes.	
1st prize, International Supply Co., Toronto.	6 00
Five Cheese boxes, for shipping purposes.	
1st prize, A. W. Covell, Lombardy	6 00
2nd do, Rawfleisch & Schaefer, Tavistock	4 00
Best outfit for manufacturing cheese, Harford Ashley, Belleville	25 00
Best outfit for manufacturing butter, Champion Cabinet Creamer Company, Morrisburg	15 00

Extras.—A Dom. Silver Medal was awarded to the International Supply Co., of Toronto, for their outfit for manufacturing butter. A Dom. Bronze Medal was also given to Mrs. D. McNamee, of Warburton, for taking two first prizes in butter. Diploma awarded Champion Cabinet Creamer Company, Morrisburg, for collection comprising churn arrangement for raising cream, butter worker, and refrigerator for milk dealers' use. Highly commended: cheese-cotton, Jas. Goddard, Toronto. Gruyen or Swiss cheese, Jno. Martig, Kingston Mills.

Dominion Sweepstakes.

Gold Medal and $50.

A Dom. Gold Medal and $50 given for the best made and most perfect lot of cheese in any class that has taken a first prize, was awarded to Jas. Whitton, Wellman's Corners.

PROCESS OF BUTTER-MAKING.

Class 39; Sections 1 and 3.

To Henry Wade,
Secretary Provincial Exhibition.

Number of cows, 22; ordinary farmer's dairy. Cool milk when first taken from the cows; put away in shallow pans, and skim it when it is just beginning to "turn"—do not allow it to become sour; the least sign of turning is time to skim. Then cool the cream down to about 62° and churn in common "dash churn" by horse-power. Salt about 1 oz. to every pound—use the best Liverpool Salt. Work it over and set it away till the salt dissolves; then "work" it over again and pack in white-ash tubs.

William Graham.

Smith's Falls, County Leeds.

CAINTOWN, September 22, 1882.

To HENRY WADE, ESQ.,

Secretary Provincial Exhibition, Kingston.

DEAR SIR,—Having had the honour of carrying off the 2nd prize for creamery butter at the Provincial Fair, Kingston, and being asked to make known the manner or mode of making, I gladly do so for the benefit of all concerned.

Factory, frame building; number of cows, 300. Milk set in pails 20 in. in height, by 8 in. in diameter, in pools; length of time set, 24 and 36 hours. Churned by barrel-hurn, similar to the one shown at Exhibition; length of time churning, about one hour, at about 60°. Butter is washed in churn by salt brine, afterwards by water. Salted, 1 lb. of salt to 20 lbs. of butter (Eureka salt). Worked lightly the following day and packed for market. Breed of cows, common Canadian cattle, with a little mixture of Ayrshire.

Yours truly,

ALEX. THOMPSON.

ESCOTT, Ont., September 23. 1882.

HENRY WADE, ESQ., Kingston.

SIR,—We make sweet cream butter only. We set our milk 12 and 24 hours before skimming. Our cooling process is the deep setting containing the pails, the latter being 20 in. high and 8 in. across the top. They are then set in water, standing at about 46° cold. We use the barrel-churn without any paddles on the inside, churning the butter until it is in small kernels; we then draw off the butter-milk and put cold water in the churn, washing the butter with two changes of water. It is then taken out, salted and let stand until the next day before packing. Our factory is about 52 feet by 30 feet. We have about 400 cows, and the breed is only the common Canadian. The quantity of milk in the flow is about 10,000 lbs. We use Higgins' Eureka Fine Salt.

Yours truly,

DAVID MAY.

HENRY WADE, ESQ.,

Secretary Agricultural and Arts Association.

DEAR SIR,—I beg to submit a statement showing the mode of manufacture of the First Prize Butter, in Sections 3 and 5, Class 39.

Our dairy consists of 14 cows, common stock, with a mixture of Ayrshire. When we commenced making butter, 1st September, they were giving about 180 lbs. of milk per day, which increased during the 11 days to about 240 lbs., on fresh pasture, with the addition of some carrots. Our mode of manufacture is on the old style, with the addition of cooling the milk before setting, which is done in a common can and cooler. When the milk is cold, it is set in common sap cans of ten quarts, which are set in a cellar with a temperature of from 60° to 70°, where it remains until the cream is raised and ready to separate from the milk, which generally occupies about 36 to 48 hours. The cream is then taken and churned in an old-fashioned dash churn, at about 65° Fahr., washed and salted with Liverpool fine salt, half ounce per lb., and set by for 12 hours, when it is wrought over and packed. The tub and crock, which contains about 115 lbs., was filled in eleven days, then covered with salt, without any brine, and finished.

Yours truly,

MRS. B. MCNAMEE.

Loborough, September 22, 1882.

To the Secretary of the Provincial Exhibition, Kingston.

Dear Sir,—The firkin of butter, of 50 lbs. shipping order, that was awarded Fourth Prize, was manufactured from the milk of six grade cows, which I strain in pans holding five quarts each. When the cream properly raises, I skim and churn when fit. After being churned, I wash the butter thoroughly to cleanse it from all butter-milk. Then to every 10 lbs. of butter I put ½ lb. of Liverpool salt and 2 ozs. of white sugar: mix well and let stand two hours, then work and let stand two or more hours, then work well again and pack and secure from air.

Yours truly,

Eliza Lawrence.

Class 40.—Sugar, Bacon, etc.

10 Entries.

Judges.—Oliver Austin, Simcoe; William Decks, North Williamsburg.

Best maple sugar, 30 lbs., cake, Arch. Knight, Cataraqui	$3 00
2nd do, Stephen Madden, Napanee	2 00
Best maple sugar, 30 lbs., stirred, Wm. Pennock, Elgin	3 00
Best amber cane syrup, Thomas Keenen, Kingston	5 00
Best maple syrup, 5 gallons, William Pennock, Elgin	3 00

Class 41.—Honey and Apiary Supplies.

21 Entries.

Judges.—Oliver Austin, Simcoe; William Decks, North Williamsburg.

Largest and best display of honey, Lewis Hartman, Odessa....Dom. Bronze Medal and	5 00
2nd do, J. L. P. Gordanier, Morven	5 00
3rd do, James A. G. Caton, Morven	3 00
Best Honey in the comb, not less than 10 lbs., J. L. P. Gordanier, Morven	4 00
2nd do, Lewis Hartman, Odessa	2 00
3rd do, E. Baiden, Portsmouth	1 00
Best jar of clear honey, Lewis Hartman, Odessa	4 00
2nd do, J. L. P. Gordanier, Morven	2 00
3rd do, James A. G. Caton, Morven	1 00
Best bee hive, Thomas Beall, Lindsay	3 00

Extras.—Highly commended, Honey Extractor, Lewis Hartman, Odessa.

Class 42.—Domestic Wines.

33 Entries.

Judges.—J. A. Allen, Sarnia; P. E. Bucke, Ottawa.

Professional and Commercial List.

Best half-dozen dry wines, Canada Vine Growers' Association, Toronto	10 00
Best half-dozen sweet wines, Canada Vine Growers' Association, Toronto	6 00
Best half-dozen sparkling wines, Canada Vine Growers' Association, Toronto	$10 00
Best half-dozen Canada claret, Canada Vine Growers' Association, Toronto	6 00
Open to all professionals and amateurs. Best assortment of wines made from grapes of Canadian growth, Canada Vine Growers' Association	Diploma

General List. Professional and Commercial Wine-makers excluded.

All wines to be from the hardy grape, and to be exhibited in a uniform manner and quantity, in the ordinary pint bottle, known as the English wine bottle.

Best three bottles, dry wine, white, Henry Lutz, Stony Creek	6 00
2nd do, Henry Lutz, Stony Creek	3 00
Best three bottles, dry wine, red, J. D. Lutz, Stony Creek	6 00
2nd do, Henry Lutz, Stony Creek	3 00
Best three bottles, sweet wine, white, J. D. Lutz, Stony Creek	4 00
2nd do, Henry Lutz, Stony Creek	2 00
Best three bottles, any other sort of grape wine, Henry Lutz, Stony Creek	4 00
2nd do, J. D. Lutz, Stony Creek	2 00

Extras.—Diploma: for amber and pale ales, lager beer and porter, Jos. Fisher, Kingston, highly commended; cider, rasberry-vinegar, and currant wine, Mrs. John Craig, Kingston; wild grape wine, John Wright, Kingston; raspberry vinegar, Miss Lynch Kingston.

Class 43.—Fruit—Professional Nurserymen's List.

35 Entries.

Judges.—C. M. Honsberger, Jordan; Alexander Glass, Hamilton; F. B. Lewis, Lockport, N. Y.

Best twenty varieties of apples, correctly named, five of each, A. M. Smith, & Co., Grimsby.....Dom. Bronze medal and	10 00
2nd do, David Nicol, Cataraqui	8 00
Best four varieties fall table apples, named, five of each, David Nicol, Cataraqui	3 00
2nd do, A. M. Smith & Co., Grimsby	2 00
Best six varieties of fall cooking apples, named, five of each, A. M. Smith, & Co., Grimsby	3 00
2nd do, David Nicol, Cataraqui	2 00
Best six varieties of winter table apples, named, five of each, A. M. Smith & Co., Grimsby	3 00

2nd do, David Nicol, Cataraqui..... $2 00
Best six varieties of winter cooking apples, named, five of each, A. M. Smith & Co., Grimsby..... 3 00
2nd do, David Nicol, Cataraqui..... 2 00
Best fifteen varieties of pears, correctly named, five of each, A. M. Smith & Co., Grimsby..... Dom. Bronze Medal and 10 00
Best six varieties do, correctly named, five of each, A. M. Smith & Co., Grimsby..... 5 00
2nd do, Jno. Holder, St. Catharines..... 3 00
Best six varieties do, green or yellow, correctly named, six of each, A. M. Smith & Co., Grimsby 5 00
Best ten varieties of peaches, correctly named, six of each, A. M. Smith & Co., Grimsby 6 00
Best twelve varieties of grapes, grown in open air, two bunches each, correctly named, John Holder, St. Catharines 8 00
2nd do, A. M. Smith & Co., Grimsby..... 6 00
Best four varieties black grapes, grown in open air, two bunches each, correctly named, A. M. Smith & Co., Grimsby..... 3 00
Best four varieties white grapes, grown in open air, two bunches each, correctly named, Jno. Holder, St. Catharines..... 3 00
Best four varieties red grapes, grown in open air, two bunches each, correctly named, A. M. Smith & Co..... 3 00
2nd do, Jno. Holder, St. Catharines..... 2 00
Best six varieties grapes, grown under glass, one bunch of each sort, correctly named, John Holder, St. Catharines..... 8 00
2nd do, David Nicol, Cataraqui 6 00
Best three varieties of grapes, three distinct colours, grown under glass, one bunch each, John Holder, St. Catharines..... 4 00
2nd do, David Nicol, Cataraqui..... 2 00
Heaviest one bunch Hamburg grapes, grown under glass, David Nicol, Cataraqui..... 3 00
2nd do, Jno. Holder, St. Catharines..... 2 00
Heaviest one bunch black grapes, any other kind, grown under glass, Jno. Holder, St. Catharines 3 00
Heaviest one bunch white grapes, grown under glass, John Holder, St. Catharines..... 3 00
Best display of fruit, the growth of exhibitor, not more than five specimens of each variety of apple and pear, named, grown under glass and in open air, A. M. Smith & Co..... Dom. Bronze Medal and 20 00
Best collection of one dozen each of six varieties of crabs, cultivated, A. M. Smith & Co. 3 00

CLASS 44.—FRUIT—GENERAL LIST—APPLES AND PEARS.

1,306 ENTRIES.

JUDGES.—A. M. Smith, Grimsby; Chas. Arnold, Paris.

Best twenty varieties apples, correctly named, five of each, J. D. Lutz, Stony Creek, ...Dom. Bronze Medal and 10 00
2nd do, J. B. Walker, Grimsby 8 00
3rd do, G. J. Miller, Virgil 6 00
4th do, Jno. P. Williams, Bloomfield..... 4 00
Best ten varieties apples, correctly named, five of each, J. B. Walker, Grimsby..... 6 00
2nd do, J. D. Lutz, Stony Creek 4 00
3rd do, G. J. Miller, Virgil..... 2 00
Best four varieties dessert apples, correctly named, five of each, J. D. Lutz..... 3 00
2nd do, J. B. Walker..... 2 00
3rd do, Henry Lutz, Stony Creek 1 00
Best four varieties cooking apples, correctly named, five of each, J. D. Lutz..... 3 00
2nd do, J. B. Walker,..... $2 00
3rd do, Benj. Story, Picton..... 1 00
Best five Early Joe, Arch. Knight, Cataraqui 2 00
2nd do, Chas. Scott, Melville Cross,..... 1 00
Best five Benoni, J. P. Williams, Bloomfield 2 00
Best five Hawley, J. P. Williams..... 2 00
Best five Duchess of Oldenburg, E. H. Wartman, Kingston..... 2 00
2nd do, R. J. Graham, Belleville..... 1 00
Best five snow apples, Robt. Vair, Glenburnie 2 50
2nd do, Arthur R. Hora, Kingston..... 2 00
3rd do, D. G. Fraser, Northport..... 1 50
Best five Fall Pippins, J. D. Lutz 2 00
2nd do, J. P. Williams, Bloomfield..... 1 00
Best five Gravenstein, G. J. Miller, Virgil... 2 00
2nd do, Geo. Cairns, Virgil 1 00
Best five Maiden's Blush, William Anderson, Hamilton..... 2 00
2nd do, J. D. Lutz 1 00
Best five Cayuga Red Streak, Wm. Chestnut, Kingston 2 00
2nd do, J. D. Lutz..... 1 00
Best five Mother, G. J. Miller..... 2 00
Best five St. Lawrence, Francis Peck, Albury 2 00
2nd do, G. J. Miller..... 1 00
Best five Colvert, Wm. Anderson, Hamilton 2 00
2nd do, Geo. Cairns..... 1 00
Best five Porter, E. H. Wartman, Kingston.. 2 00
2nd do, G. J. Miller 1 00
Best five of any other variety fall apple, correctly named, J. B. Walker..... 2 00
2nd do, R. J. Graham, Belleville..... 1 00
Best five fall seeding apples, William Herbison, Clinton..... 2 00
2nd do, J. B. Walker..... 1 00
Best five Ribstone Pippin, J. D. Lutz..... 2 00
2nd do, Arthur R. Hora, Kingston 1 00
Best five Alexander, E. H. Wartman, Kingston 2 00
2nd do, Jno. Hopkins, Millhaven..... 1 00
Best five Æsopus Spitzenburg, J. B. Walker 2 00
2nd do, J. D. Lutz..... 1 00
Best five Baldwin, J. B. Walker..... 2 50
2nd do, J. D. Lutz..... 2 00
3rd do, Wm. Anderson..... 1 50
4th do, Geo. Cairns..... 1 00
Best five Rhode Island Greening, J. D. Lutz. 2 50
2nd do, Henry Lutz..... 2 00
3rd do, Jno. Hopkins..... 1 50
4th do, Geo. Cairns..... 1 00
Best five Wagner, J. D. Lutz..... 2 00
2nd do, E. H. Wartman, Kingston..... 1 00
Best five yellow bellflower, Mrs. J. Northmer, Cataraqui 2 00
2nd do, J. D. Lutz 1 00
Best five King of Tomkins Co., J. D. Lutz.. 2 00
2nd do, E. H. Wartman..... 1 00
Best five Talman's sweet, J. B. Walker. 2 00
2nd do, J. D. Lutz..... 1 00
Best five Grimes' Golden, Francis Peck, Albury 2 00
2nd do, Thos. Beall, Lindsay..... 1 00
Best five Seek-no-further, J. B. Walker..... 2 00
Best five Roxbury Russet, J. B. Walker..... 2 50
2nd do, J. D. Lutz 2 00
3rd do, Geo. Cairns..... 1 50
4th do, Henry Lutz..... 1 00
Best five Swaar, Francis Peck 2 00
2nd do, J. P. Williams 1 00
Best five Fallawater, J. D. Lutz 2 00
2nd do, J. P. Williams..... 1 00
Best five American Golden Russett, J. B. Walker 2 50
2nd do, Mrs. J. Northmer, Cataraqui..... 2 00
3rd do, J. D. Lutz..... 1 50
4th do, Geo. Cairns 1 00
Best five Swayzie Pomme Grise, J. D. Lutz. 2 50
2nd do, G. J. Miller..... 2 00

2rd do, Geo. Cairns	$1 50
4th do, Thos. Beall	1 00
Best five Pomme Grise, Edward Cook, Cataraqui	1 00
2nd do, J. B. Walker	1 00
Best five Nothern Spy, E. H. Wartman	2 50
2nd do, Benj. Story, Picton	2 00
3rd do, Robert Madden, Napanee	1 50
4th do, Edward Cook	1 00
Best five wealthy, Arch'd. Knight	2 00
2nd do, Thos. Beall	1 00
Best five Scott's Russett, J. D. Lutz	2 00
Best five Ben Davis, Jno. Simpson, Cataraqui	2 00
2nd do, D. G. Fraser, Northport	1 00
Best five any other variety (winter) apple correctly named, J. D. Lutz	2 00
2nd do, Henry Lutz	1 00
Best five winter seedling apples, J. B. Walker	2 00
2nd do, J. P. Williams	1 00
Best twelve varieties of pears, five of each, G. J. Miller.....Dom. Bronze Medal and	10 00
2nd do, Samuel Woodley, Hamilton	8 00
3rd do, Wm. Anderson, Hamilton	6 00
4th do, T. R. Merritt. St, Catharines	4 00
Best six varieties of pears, five of each Fred B. Lewis, Lockport, N. Y.	4 00
2nd do, G. J. Miller	2 00
Best five Kirtland, Fred B. Lewis	2 00
2nd do, J. D. Lutz	1 00
Best five Clapp's favourite, J. D. Lutz	2 00
2nd do, G. J. Miller	1 00
Best fine Annas d'Ete Alex. Glass, St. Catharines	2 00
2nd do, T. R. Merritt	1 00
Best five Tyson, T. R. Merritt	2 00
2nd do, J. P. Williams	1 00
Best five Bartletts, G. J. Miller	2 50
2nd do, Geo. Cairns	2 00
3rd do, Geo. E. Gordanier, Morven	1 50
4th do, Saml. Woodley, Hamilton	1 00
Best five Seckel, Wm. Anderson, Hamilton	2 00
2nd do, Saml. Woodley	1 00
Best five Souvenir de Congress, S. Woodley	2 00
Best five Louise Bonne de Jersey, W. Anderson	2 50
2nd do, Fred B. Lewis	2 00
3rd do, G. J. Miller	1 50
4th do, Saml. Woodley	1 00
Best five Belle Lucrative, G. J. Miller	2 00
2nd do, Saml. Woodley	1 00
Best five Beurre Bosc, G. J. Miller	2 00
2nd do, Fred B. Lewis	1 00
Best five Beurre Hardy, Saml. Woodley	2 50
2nd do, G. J. Miller	2 00
3rd do, Geo. Cairns	1 50
Best five Goodale, Fred B. Lewis	2 00
2nd do, G. J. Miller	1 00
Best five white Doyenne, Wm. Anderson	2 00
2nd do, Saml. Woodley	1 00
Best five Sheldon, J. D. Lutz	2 00
2nd do, Wm. Anderson	1 00
Best five Flemish Beauty, T. R. Merritt	2 50
2nd do, Wm. Anderson	2 00
3rd do, Geo. Cairns	1 50
4th do, J. L. Clapp, Belleville	1 00
Best five Beurre Superfin, Fred. B. Lewis	2 50
2nd do, G. J. Miller	2 00
3rd do, T. R. Merritt	1 50
Best five Beurre Diel, Sam. Woodley	2 00
2nd do, Wm. Anderson	1 00
Best five Beurre d'Anjou, Fred. B. Lewis	2 50
2nd do, G. J. Miller	2 00
3rd do, Geo. Cairns	1 50
4th do, Sam. Woodley	1 00
Best fine Beurre Clairgeau, G. J. Miller	2 00
2nd do, T. R. Merritt	1 00
Best five Duchesse d'Angouleme, W. Anderson	2 50
2nd do, Fred. B. Lewis	2 00
3rd do, G. J. Miller	$1 50
4th do, J. D. Lutz	1 00
Best five Doyenne Boussock, J. D. Lutz	2 00
2nd do, G. J. Miller	1 00
Best five Grey Doyenne, G. J. Miller	2 00
2nd do, Sam. Woodley	1 00
Best five Swan's Orange, Geo. Cairns	2 00
Best five Beurre de L'Assomption, S. Woodley	2 00
Best five of any other variety of fall pear, correctly named, G. J. Miller	2 00
2nd do, Sam. Woodley	1 00
Best five Mount Vernon, G. J. Miller	2 00
2nd do, Geo. Cairns	1 00
Best five Beurre Gris d'Hiver Noveau, G. J. Miller	2 00
2nd do, T. R. Merritt	1 00
Best five Winter Nelis, G. J. Miller	2 50
2nd do, Geo. Cairns	2 00
3rd do, Sam. Woodley	1 50
4th do, Wm. Anderson	1 00
Best five Vicar of Wakefield, G. J. Miller	2 00
2nd do, Wm. Anderson	1 00
Best five Lawrence, Alex. Glass, St. Catharines	2 50
2nd do, Saml. Woodley	2 00
3rd do, G. J. Miller	1 50
4th do, Fred B. Lewis	1 00
Best five of any other variety of winter pear, correctly named, G. J. Miller	2 00
2nd do, Saml. Woodley	1 00
Best five seedling pears, winter, J. D. Lutz	2 00
2nd do, G. J. Miller	1 00

Extras.—Highly commended; five strawberry apples, Jno. Hopkins, Mill Haven; do, Jno. Simpson, Cataraqui.

Class 45.—Plums, Peaches, Grapes, Etc.

396 Entries.

Judges.—Alex. McD. Allan, Goderich; B. Gott, Arkona; J. D. Lutz, Stony Creek.

Best six varieties plums, green or yellow, correctly named, six of each, Alex. Glass, St. Catharines	$4 00
2nd do, T. R. Merritt, St. Catharines	3 00
Best six varieties plums, red or blue, correctly named, six of each, Alex. Glass	4 00
2nd do, T. R. Merritt	3 00
Best twelve Lombard, Samuel Woodley, Hamilton	2 00
2nd do, Alex. Glass	1 00
Best twelve Washington, Alex. Glass	2 00
Best twelve Victoria, Samuel Woodley	2 00
2nd do, Alex. Glass	1 00
Best twelve Coe's Golden Drop, Alex. Glass	2 00
2nd do, G. J. Miller	1 00
Best twelve Yellow Egg-plums, Alex. Glass	2 00
2nd do, T. R. Merritt	1 00
Best twelve Smith's Orleans, Alex. Glass	2 00
2nd do, T. R. Merritt	1 00
Best twelve Green Gage, Alex. Glass	2 00
2nd do, T. R. Merritt	1 00
Best twelve Imperial Gage, Alex. Glass	2 00
2nd do, T. R. Merritt	1 00
Best twelve Pond's Seedling, Alex. Glass	2 00
Best twelve Glass Seedling, Alex. Glass	2 00
Best twelve Peach Plum, Alex. Glass	2 00
Best twelve General Hand, Alex. Glass	2 00
Best twelve Jefferson, Alex. Glass	2 00
Best twelve Reine Claude de Bavay, Alex. Glass	2 00
2nd do, T. R. Merritt	1 00
Best twelve dessert plums, 1 variety, correctly named, T. R. Merritt	2 00

2nd do, Alex. Glass $1 00
Best twelve cooking plums, 1 variety, correctly named, Alex. Glass 2 00
2nd do, T. R. Merritt, ... 1 00
Best twelve Seedling Plums, Alex. Glass 2 00
2nd do, Jas. Cooke, Cataraqui 1 00
Best six varieties of peaches, correctly named, 6 of each, C. M. Honsberger, Jordan 4 00
2nd do, J. B. Walker, Grimsby 2 00
3rd do, George Cairns 1 00
Best six Early Crawfords, J. B. Walker 2 00
2nd do, George Cairns 2 00
Best six Late Crawfords, C. M. Honsberger 2 00
2nd do, Geo. Cairns 1 00
Best six peaches, any other variety correctly named, C. M. Honsberger 2 00
2nd do, Alex. Glass 1 00
Best six peaches, any other variety, correctly named, J. B. Walker 2 00
2nd do, C. M. Honsberger 1 00
Best six peaches, yellow flesh, any other variety, correctly named, C. M. Honsberger 2 00
2nd do, J. B. Walker 1 00
Best six seedling peaches, yellow flesh, J. B. Walker 2 00
2nd do, G. J. Miller 1 00
Best six seedling peaches, white flesh, J. D. Lutz 2 00
Best collection of grapes grown in open air, 12 varieties, 2 bunches of each, Samuel Woodley 8 00
2nd do, J. A. Allen, Kingston 6 00
Best six varieties of grapes, (open air) two bunches of each, Samuel Woodley 5 00
2nd do, Wm. Anderson 3 00
3rd do, D. G. Fraser, Northport 2 00
Best two bunches Concord grapes, Samuel Woodley 2 00
2nd do, J. A. Allen, Kingston 1 00
Best two bunches Delaware, Sam'l Woodley 2 00
2nd do, J. A. Allen 1 00
Best two bunches Diana, Samuel Woodley 2 00
Best two bunches Creveling, Samuel Woodley 2 00
2nd do, Wm. Anderson 1 00
Best two bunches Rogers' 4, Wm. Anderson. 2 00
2nd do, Samuel Woodley 1 00
Best two bunches Rogers' 3, Samuel Woodley 2 00
Best two bunches Rogers' 15, Wm. Anderson 2 00
2nd do, Samuel Woodley 1 00
Best two bunches Rogers' 19, Sam'l Woodley. 2 00
2nd do, Wm. Anderson, ... 1 00
Best two bunches Rogers' 44, Wm. Anderson. 2 00
2nd do, Samuel Woodley 1 00
Best two bunches Salem, Samuel Woodley 2 00
2nd do, J. A. Allen, ... 1 00
Best two bunches Eumelan, Samuel Woodley 2 00
2nd do, Wm. Anderson 1 00
Best two bunches Hartford Prolific, Samuel Woodley 2 00
2nd do, D. G. Fraser 1 00
Best two bunches Iona, Samuel Woodley 2 00
2nd do, J. A. Allen 1 00
Best two bunches Israella, Samuel Woodley . 2 00
2nd do, Wm. Anderson 1 00
Best two bunches Allen's Hybrid, Wm. Anderson 2 00
2nd do, Samuel Woodley 1 00
Best two bunches Champion, Sam'l Woodley. 2 00
Best two bunches Clinton, Wm. Anderson 2 00
2nd do, D. G. Fraser 1 00
Best two bunches Walter, Samuel Woodley 2 00
Best two bunches Martha, Samuel Woodley 2 00
Best two bunches of any other variety, Sam'l Woodley 2 00
2nd do, J. A. Allen 1 00
Best collection grapes, grown under glass, 6 varieties, one bunch each, correctly named, J. A. Allen 8 00
2nd do, T. R. Merritt $6 00
Best two bunches Black Hamburg, J. A. Allen 2 00
2nd do, T. R. Merritt 1 00
Best two bunches black grapes, any other variety, T. R. Merritt 3 00
2nd do, J. A. Allen 2 00
Best two bunches red grapes, any other variety, T. R. Merritt 2 00
Best two bunches white grapes, grown under glass, correctly named, J. A. Allen 3 00
2nd do, T. R. Merritt 2 00
Best six nectarines, named, G. J. Miller 3 00
2nd do, George Cairns 2 00
Best six quinces, J. B. Walker 2 00
2nd do, G. J. Miller 1 00
Best green flesh melon, E. Baiden, Portsmouth 2 00
2nd do, J. L. Nicol, Cataraqui 1 00
Best red or scarlet flesh melon, Francis Peck, Albury 2 00
Best water melon, Geo. E. Gordanier, Morven 2 00
2nd do, Francis Peck 1 00
Best citron, George Ford, Portsmouth 2 00
2nd do, J. Knight 1 00
Best three clusters uncultivated native wild grape, Henry Lutz 2 00
Best four varieties cultivated crab, 12 each, Francis Peck 2 00
2nd do, A. Bridge, West Brook 1 00
Largest and best collection cultivated crabs, Francis Peck 4 00
2nd do, G. J. Miller 2 00

EXTRAS.—Dom. Silver Medal and Diploma for exhibit of dried corn, canned and dried fruits, Aylmer Canning Co., Aylmer.

COLLECTIONS.

41 ENTRIES.

JUDGES.—P. C. Dempsey, Albury; D. W. Beadle, St. Catharines.

APPLES.

Best collection of 40 varieties, five of each, J. D. Lutz, Stony Creek ..... Dom. Bronze Medal and $12 00
2nd do, Owen Sound Horticultural Society 10 00
3rd do, J. P. Williams, Bloomfield 6 00

PEARS.

Best collection of 20 varieties, named, five of each, Sam'l Woodley, ... Dom. Bronze Medal and $10 00
2nd do, T. R. Merritt 8 00
3rd do, G. J. Miller 5 00

PLUMS.

Best collection of 20 varieties, named, six of each, Owen Sound Horticultural Society, ... Dom. Bronze Medal and $10 00
2nd do, Alex. Glass, St. Catharines 8 00
3rd do, T. R. Merritt 5 00

PEACHES.

Best collection of 12 varieties, named, six of each, J. B. Walker, Grimsby ..... Dom. Bronze Medal and $10 00
2nd do, A. M. Smith & Co., Grimsby 8 00
3rd do, Geo. Cairns 5 00

GRAPES—Grown in the open air.

Best collection of 20 varieties, named, two bunches of each, Samuel Woodley. . . . . Dom. Bronze Medal and $10 00

CLASS 46.—GARDEN VEGETABLES.

436 ENTRIES.

JUDGES.—John P. Williams, Picton; George Cairns, Niagara; Thos. Beall, Lindsay.

Best twelve roots of salsify, George Cairns, Virgil ... $2 00
2nd do, Stephen Madden, Napanee ... 1 00
Best three heads cauliflower, E. Baiden, Portsmouth ... 2 00
2nd do, Geo. Ford, Portsmouth ... 1 00
Best three heads cabbage (early York), Francis Peck, Albury ... 2 00
2nd do, John Friendship, Portsmouth ... 1 00
Best three heads cabbage, (Winningstadt) J. Knight, Cataraqui ... 2 00
2nd do, Francis Peck, Albury ... 1 00
Best three heads cabbage, (Oxheart) Samuel N. Watts, Portsmouth. ... 2 00
2nd do, Francis Peck ... 1 00
Best three heads cabbage, (St. Dennis) Francis Peck ... 2 00
2nd do, E. Baiden ... 1 00
Best three heads cabbage, (Quintal) Samuel N. Watts ... 2 00
2nd do, E. Baiden ... 1 00
Best three heads cabbage, (Drumhead) E. Baiden ... 2 00
2nd do, Charles George, Kingston ... 1 00
Best four sorts winter cabbage, including savoys, one of each sort, Samuel N. Watts 3 00
2nd do, Thos. Englang, Kingston ... 2 00
Best three heads red cabbage, Geo. Ford, Portsmouth ... 2 00
2nd do, Charles George ... 1 50
3rd do, Thos. Englang ... 1 00
Best twelve carrots, for table, long red, Samuel N. Watts ... 2 00
2nd do, Wm. Benham, Guelph ... 1 50
3rd do, Charles George ... 1 00
Best twelve intermediate or half-long carrots, Albert Graham, Kingston ... 2 00
2nd do, Samuel N. Watts ... 1 50
3rd do, Chas. George ... 1 00
Best twelve Early Horn carrots, Chas. George 2 00
2nd do, Samuel N. Watts ... 1 50
3rd do, George Cairns ... 1 00
Best twelve table parsnips, Chas. George ... 2 00
2nd do, Samuel N. Watts ... 1 50
3rd do, Wm. Benham, Guelph ... 1 00
Best six roots white celery, John Wright, Kingston ... 2 00
2nd do, Albert Graham, Kingston ... 1 50
3rd do, George Ford ... 1 00
Best six roots red celery, J. L. Nicol, Cataraqui ... 2 00
2nd do, J. D. Lutz, Stony Creek ... 1 50
3rd do, Thos. Friendship, Kingston ... 1 00
Best dozen capsicums, (ripe) J. Knight ... 2 00
2nd do, John Harker, Sharpton ... 1 50
3rd do, Thos. Friendship ... 1 00
Best collection of capsicums, (ripe) John Harker, Sharpton ... 2 00
2nd do, Thos. Friendship ... 1 50
3rd do, Jno. Friendship ... 1 00
Best three-egg plant, fruit (purple) Thomas Friendship ... 2 00
2nd do, Wm. Chestnut, Kingston ... 1 50
3rd do, Samuel N. Watts ... 1 00
Best twelve tomatoes, (Trophy) Geo. Cairns .. 2 00
2nd do, John Harker ... 1 50
Best twelve tomatoes, (Gen. Grant) Geo. Cairns ... $2 00
2nd do, Albert Graham ... 1 50
Best twelve tomatoes, (Cook's Favourite) E. Baiden ... 2 00
2nd do, W. J. Purdy, Cataraqui. ... 1 00
Best twelve Arlington tomatoes, J. D. Lutz.. 2 00
2nd do, J. L. Nicol ... 1 00
Best twelve Conqueror tomatoes, Jno. Harker 2 00
2nd do, John Friendship ... 1 00
Best twelve Dempsey's Seedling, Geo. Cairns. 2 00
Best twelve tomatoes, (large yellow) Thomas Friendship ... 2 00
2nd do, Jno. Harker ... 1 00
Best twelve any other variety tomatoes, Geo. Cairns ... 2 00
2nd do, P. E. and W. E. Ward, Kingston ... 1 00
Best collection of tomatoes, Jno. Harker ... 3 00
Best six blood beets, long, Wm. Benham ... 2 00
2nd do, Samuel N. Watts ... 1 50
3rd do, Geo. Croft, Portsmouth ... 1 00
Best six turnip rooted beets, John Wright, Kingston ... 2 00
2nd do, Thomas Friendship ... 1 50
3rd do, Samuel N. Watts ... 1 00
Best peck white onions, J. L. Nicol ... 2 00
2nd do, Samuel N. Watts ... 1 50
3rd do, Geo. Croft ... 1 00
Best peck of yellow onions J. L. Nicol ... 2 00
2nd do, Albert Graham ... 1 50
3rd do, Samuel N. Watts ... 1 00
Best peck red onions. J. L. Nicol ... 2 00
2nd do, Geo. Croft ... 1 50
3rd do, Geo. Ford ... 1 00
Best two quarts pickling onions, Jno. Wright 1 50
2nd do, Jno. Friendship ... 1 00
Best twelve white turnips, (table) William Benham ... 2 00
2nd do, Chas. George ... 1 50
3rd do, Samuel N. Watts ... 1 00
Best twelve yellow turnips, (table) William Benham ... 2 00
2nd do, Chas. Scott, Melville Cross ... 1 50
Best twelve ears sweet corn, fit for the table, Geo. Cairns ... 2 00
2nd do, C. T. Lane, Warkworth ... 1 50
3rd do, Francis Peck ... 1 00
Best French beans, quart, Chas. Scott. ... 2 00
2nd do, Thos. Friendship ... 1 00
Best six winter radish, Chas. Scott ... 2 00
2nd do, Thos Friendship ... 1 00
Best three Scotch kale, Chas. George ... 2 00
2nd do, Samuel N. Watts ... 1 00
Best collection pot and sweet herbs, Chas. Scott 2 00
2nd do, E. Baiden ... 1 00
Best varieties of potatoes for garden cultivation, half peck of each sort, named, Francis Peck ... 4 00
2nd do, John Hewer, Guelph ... 3 00
3rd do, Arch. Knight ... 2 00
Best three varieties table squashes, Francis Peck ... 2 00
Best two vegetable marrow, Jno. Friendship. 2 00
2nd do, Thos. Friendship ... 1 00
Best collection of vegetables (distinct from other entries), each kind named, Samuel N. Watts ... 4 00
2nd do, E. Baiden ... 3 00
3rd do, A. S. Grimshaw, Wolfe Island ... 2 00

EXTRAS.—Highly commended: Peck Top Onions, Edward Cooke, Cataraqui. Peck Potato Onions, Geo. Croft, Portsmouth. Twelve leeks, Samuel N. Watts, Portsmouth. Ripe cucumbers, 2 quarts pickling cucumbers, John Friendship, Portsmouth. Californian cucumbers, W. J. Purdy, Cataraqui. Six root leeks, John Wright, Kingston. Extra flat Dutch cabbage, and butter beans, John Friendship, Portsmouth.

CLASS 47.—PLANTS AND FLOWERS.

Part 1.—*Cut Flowers.*

138 ENTRIES.

JUDGES.—S. McCammon, Gananoque; R. A. Peterson, Picton; F. B. Lewis, Lockport, N.Y.

Best twelve varieties standard dahlias, named, one of each, M. E. Flanagan, Kingston..	$3 00
Best twelve bouquet dahlias, named, one of each, M. E. Flanagan	3 00
Largest and best collection of dahlias, named, one of each, M. E. Flanagan	5 00
Two large vase bouquets, J. L. Nicol, Cataraqui	4 00
2nd do, M. E. Flanagan	3 00
3rd do, David H. Murray, Kingston	2 00
Best pair side table or fan bouquets, M. E. Flanagan	3 00
2nd do, David H. Murray	2 00
Best hand bouquet, J. L. Nicol	2 00
2nd do, David H. Murray	1 50
3rd do, M. E. Flanagan	1 00
Best bouquet, everlastings, David H. Murray	2 00
2nd do, Jno. Friendship, Portsmouth	1 50
3rd do, Thos. Friendship, Kingston	1 00
Best bouquet, wild flowers, David H. Murray	3 00
2nd do, Chas. Scott, Melville Cross	2 00
3rd do, Thos. Friendship	1 00
Best twelve pansies, M. E. Flanagan	2 00
2nd do, Chas Scott	1 50
Best collection annuals, in bloom, named, Thos. Friendship	5 00
2nd do, Chas. Scott	3 00
3rd do, M. E. Flanagan	2 00
Best twelve German asters, M. E. Flanagan.	2 00
2nd do, M. E. Flanagan	1 50
3rd do, Chas. Scott	1 00
Best collection of asters, M. E. Flanagan	3 00
2nd do, Chas. Scott	2 00
3rd do, Thos. Friendship	1 00
Best collection of ten-week stocks, M. E. Flanagan	2 00
2nd do, Chas. Scott	1 50
Best collection of marigolds, Chas. Scott	2 00
2nd do, M. E. Flanagan	1 50
Best collection of hybrid perpetual and perpetual moss roses, named, M. E. Flanagan	5 00
Best three roses of any other variety, M. E. Flanagan	3 00
Best floral design for supper-table, David H. Murray	5 00
2nd do, Ede. St. Remy, Kingston	4 00
3rd do, Miss Ferguson, Kingston	3 00
Best twelve verbenas, named, M. E. Flanagan	2 00
2nd do, J. L. Nicol	1 50
3rd do, Thos. Friendship	1 00
Best collection verbenas, named, M. E. Flanagan	3 00
2nd do, J. L. Nicol	2 00
3rd do, Chas. Scott	1 00
Best six petunias, single, M. E. Flanagan	2 00
2nd do, J. L. Nicol	1 50
3rd do, Chas. Scott	1 00
Best six petunias, double, M.E. Flanagan	2 00
2nd do, E. Baiden, Portsmouth	1 50
3rd do, David H. Murray	1 00
Best collection Phlox Drummondii, Chas. Scott	2 00
2nd do, M. E. Flanagan	1 50
Best collection Dianthus, M. E. Flanagan	2 00
Best collection perennial phloxes, M. E. Flanagan	3 00
2nd do, J. L. Nicol	2 00
Best ten hardy shrubs, to include variegated and otherwise remarkable foliage, spikes in flower, Chas. Scott	$2 00
Best collection hollyhocks, M. E. Flanagan	2 00
2nd do, Chas. Scott	1 50
Best collection of gladiolus, M. E. Flanagan.	3 00
Best collection of double zinnias. M. E. Flanagan	2 00

Part 2.—*Plants in Pots.*

Best hanging baskets of flowers, Thos. Friendship	2 00
2nd do, Miss E. Orser, Kingston	1 50
Best collection of twenty-five greenhouse plants, David H. Murray ..... Dom. Bronze Medal and	10 00
Best collection of twenty foliage plants, David H. Murray	6 00
Best collection of Colens, twenty varieties, David H. Murray	6 00
2nd do, M. E. Flanagan	4 00
Best collection of Caladiums, ten varieties, David H. Murray	5 00
Best collection of Begonias, ten varieties, M. E. Flanagan	5 00
Best six Tuberoses, M. E. Flanagan	2 00
Best six ferns, cultivated, David H. Murray.	4 00
Best six ferns, native, Thos. Friendship	3 00
2nd do, Chas. Scott	2 00
Best six foliage plants, David H. Murray	3 00
2nd do, M. E. Flanagan	2 00
Best six cockscombs, Wm. Chestnut	2 00
2nd do, M. E. Flanagan	1 50
3rd do, Thos. Friendship	1 00
Best six varieties balsams, in bloom, M. E. Flanagan	2 00
Best twelve single geraniums in pots, named, M. E. Flanagan	5 00
2nd do, David H. Murray	3 00
Best six double geraniums, in pots, M. E. Flanagan	3 00
2nd do, David H. Murray	2 00

EXTRAS.—Highly commended—two baskets everlasting flowers, Thos. Friendship, Kingston; collection of pansies, Chas. Scott, Melville Cross.

CLASS 48.—FINE ARTS—OILS.

Professional or Amateur.—(Originals).

131 ENTRIES.

JUDGES.—Prof. Forshaw Day, R.C.A., Kingston; Almon Bristol, Picton.

Animals from life, 2nd prize, Miss Nancy Strickland, Oshawa	5 00
Best flowers or fruit, H. Vernon Brown, Kingston	8 00
2nd do, Mrs. James Stewart, Kingston	4 00
Best figure or historical subject, Paul Peel, London	12 00
2nd do, Miss Lois Saunders, Kingston	8 00
3rd do, Edmund W. Grier, Kingston	4 00
Best landscape, Canadian subject, Jas. Wilson, Ottawa	10 00
2nd do, Mrs. Jas. Stewart, Kingston	6 00
3rd do, W. Sawyer, Kingston	3 00
Best landscape or marine painting, not Canadian subject, Paul Peel, London	10 00
2nd do, Capt. Thos. Merritt, Kingston	5 00
Best portrait, Paul Peel, London	9 00
2nd do, W. Sawyer, Kingston	6 00
3rd do, Miss Lois Saunders, Kingston	3 00

Best still life, not flowers or fruit, Paul Peel. $8 00
2nd do, Mrs. J. L. Smith, Whitby 4 00

Amateur List—Oils—(Copies).

Best any subject, Miss K. E. Beemer, Toronto 8 00
2nd do, Miss Jessie Chambers, Sunbury 5 00
3rd do, Miss Edith M. Power, Kingston 3 00
Best animals from life, Thos. F. Graham, Portsmouth 8 00
2nd do, Miss Aggie Reid, Cardinal 4 00
Best figure subject, Miss K. E. Beemer, Toronto 8 00
2nd do, Miss Brown, Toronto 4 00
Best flowers or fruit, Miss Brown, Toronto .. 8 00
2nd do, Miss Hamlin, Almonte 4 00
Best landscape or marine view, Canadian subject, Miss K. E. Beemer 8 00
2nd do, Miss Bray, Kingston 4 00
Best still life, not flowers or fruit, Miss K. E. Beemer 7 00

Extras.—Bird's nest (plaque), Miss Jessie Chalmers, Sunbury. Lake study, Jas. Wilson, Ottawa. Illumination in oils, Mrs. Jos. H. Power, Kingston.

Part 2.—*Porcelain Decorations.*

Best collection of decorated porcelain, Canadian work, open to all, Mrs. Matheson, Toronto 10 00
2nd do, Mrs. J. C. Clarke, Kingston 6 00

Class 49.—Fine Arts in Water Colors, Crayons, Etc.

WATER COLORS.

Professional List—(Originals).

237 Entries.

Judges.—Prof. Forshaw Day, R.C.A, Kingston; Almon Bristol, Picton.

2nd prize landscape, Canadian subject, Thos. Merritt, Kingston 4 00
Best landscape or marine view, not Canadian subject, Thos. Merritt, Kingston 5 00

Part 2.—*Amateur List—(Originals).*

(Definitions same as in previous class.)

Best any subject, John W. H. Watts, Cumming's Bridge 5 00
2nd do, Miss Caroline S. Gagen, Toronto 3 00
3rd do, Mrs. J. C. Clarke, Kingston 2 00
Best flowers or fruit, Miss Caroline S. Gagen, Toronto 5 00
2nd do, Mrs. J. C. Clarke, Kingston 3 00
Best figure or historical subject, Miss Sidney Tully, Toronto 5 00
Best landscape or marine view, Canadian subject, John W. H. Watts, Cumming's Bridge 6 00
2nd do, Miss Willina Macpherson, Kingston. 4 00

Part 3.—*Amateur List—(Copies).*

Best animals, grouped or single, Mrs. C. C. Neville, Ottawa 4 00
2nd do, Miss Ella Fraser, Kingston 2 00
Best flowers or fruit, Miss Caroline S. Gagen, Toronto 4 00
2nd do, Miss Jessie Chambers, Sunbury ... $2 00
Best figure or historical subject, Mrs. J. C. Clarke 4 00
2nd do, Miss L. Gilmor, Toronto 2 00
Best landscape, Miss Machar, Kingston 4 00
2nd do, Miss Maude Cartwright, Kingston... 2 00
Best marine view, Miss Brown, Toronto 4 00

Crayon, Pencil, Sepia, and Pen and Ink Sketch.

Part 1.—*Professional List—(Originals).*

Best Crayon, plain, Geo. Brown, Belleville .. 4 00
2nd do, Richard Light, Kingston 2 00
Best pen and ink sketch, Edmund W. Grier, Kingston 4 00

Part 2.—*Amateur List—(Originals).*

Best pencil drawing, John W. H. Watts, Cumming's Bridge 4 00
2nd do, Miss Joness, Bowmanville 2 00
Best pen and ink sketch, John W. H. Watts. 4 00
2nd do, Dean Lyster, Kingston 2 00

Part 3.—*Amateur List—(Copies).*

Best crayon, coloured, J. B. Walkun, Kingston 4 00
2nd do, Mrs. J. L. Smith, Whitby 2 00
Crayon, plain. Miss M. R. Ferris, Kingston .. 4 00
2nd do, Mrs. T. G. Greet, Kingston 2 00
Pen and ink sketch. J. B. Walkun, Kingston 4 00
2nd do, Mrs. Jos. W. Power, Kingston 2 00
Pencil drawing, Mrs. T. Greet, Kingston 4 00
2nd do, Miss M. Strickland, Oshawa 2 00
Sepia, Miss Jessie Chambers, Sunbury 4 00
2nd do, Mrs. C. C. Neville, Ottawa 2 00

Extras.—Diploma for illumination in water colours and butterflies painted on rice paper, Mrs. Jos. W. Power, Kingston. Extra.—Teal in water colours and pencil, Mrs. T. G. Greet, Kingston. Autumn leaves, K. E. Fraser, Kingston.

Part 4.

Crayon, plain, Miss Mabel Barry, Kingston. 4 00

Class 50.—Penmanship, Linear Drawing, Photographing, Engraving, Maps, Statuary, etc.

50 Entries.

Judges.—Thos. H. McGuire, Kingston; T. M. Graham, Portsmouth.

Part 1.—*Penmanship, Geometrical.*

Architectural and Mechanical Drawings, Engravings, Lithography, etc.

Best drawings, architectural, geometrical and perspective view, John W. H. Watts, Cumming's Bridge $8 00
2nd do, J. C. Foster, Barrie 4 00
Best penmanship, business hand, without flourishes, J. Rordans & Co., Toronto ... 4 00
2nd do, J. B. McKay, Belleville 2 00
Best penmanship, ornamental (not pen and ink pictures), Mrs. J. K. Smith, Whitby 4 00
2nd do, J. B. McKay, Belleville 2 00

Part 2.—*Photography, Lithography, Engravings and Etchings, printed Maps and Atlases.*

Best photograph portraits, collection of, in duplicate, one set coloured, Jno. H. Mundy, Port Hope $8 00
Best photograph portraits, collection of plain, S. J. Dixon, Toronto..... 6 00
2nd do, Jno. H. Mundy, Port Hope..... 4 00
Best photograph landscapes and views, collection of, Jno. H. Mundy, Port Hope 6 00
Best photograph portrait, finished in oil, W. Sawyer, Kingston 6 00
2nd do, Miss Sidney Tully, Toronto 4 00
Best photograph portrait, finished in Indian ink, W. Sawyer, Kingston 5 00
2nd do, Jno. H. Mundy, Port Hope 3 00
Best photograph portrait, finished in water colours, Jno. H. Mundy, Port Hope..... 5 00
2nd do, W. Sawyer, Kingston 3 00
Best engraving on copper, with proof, John W. H. Watts, Cumming's Bridge 4 00

Part 3.—*Statuary, etc., Professional or Amateur.*

Best carving in wood, Wm. Harold. Kingston 8 00
Best modelling in plaster, Edwd. W. Rendle, Kingston 5 00

Extras.—Diploma for working model of vessels, E. Power, Kingston. Highly commended—typewriters, Thos. Bengough, Toronto; collection of photographs taken by electric light, S. J. Dixon, Toronto; sheet music, L. N. Flynn, Chicago, Ill., U. S.; case of fancy goods, albums, etc., John Henderson & Co., Kingston. Extra—Plain and fancy printing, *British Whig*, Kingston.

Class 51.—Natural History, Mineralogy.

40 Entries.

Judges.—Prof. Fowler, Kingston; Dr. Honeyman, Halifax, N. S.

BIRDS.

Best collection of native, stuffed, with common and technical names attached, and classified, David Nicol, Cataraqui $10 00
2nd do, Richard Varney, Kingston..... 6 00

INSECTS.

Best collection of native, with common and technical names attached, and classified so as to show those injurious and those beneficial to agriculture and horticulture, David H. Murray, Kingston.....$15 00

STUFFED ANIMALS.

Best, of any country, collection of, David Nicol, Cataraqui $8 00

STUFFED BIRDS.

Best, of any country, collection of, David Nicol, Cataraqui $6 00

MINERALOGY, ETC.

Best copper ores of Dominion, best collection, W. G. Kidd, Kingston..... $8 00
Best iron ores of the Dominion, best collection of, Dr. Honeyman, Halifax, N. S..... 8 00
Best lead ores of Dominion, best collection of, C. H. Hatch, Kingston $8 00
Best silver ores of the Dominion, best collection of, C. H. Hatch, Kingston..... 8 00
Best specimens, illustrating the mineralogy of Canada, best collection of, W. G. Kidd, Kingston 15 00
2nd do, C. H. Hatch, Kingston 10 00
3rd do, Mrs. Jos. W. Power, Kingston 5 00
Best mineral phosphates, display of Canadian, J. Bawden, Kingston .....Dom. Silver Medal
2nd do, W. G. Kidd, Kingston.Dom. Bronze Medal
Best collection of Canadian gems, C. H. Hatch, Kingston .....Dom. Bronze Medal
Best display of plumbago, Canadian, J. Bawden, Kingston .....Dom. Bronze Medal

Extras.—Dom. Bronze Medal and Diploma for land plaster, prepared for market, and rock gypsum, Gill, Allen & Co., Paris. Diploma for a trustum of a pyramid of gypsum, from Baddeck, Cape Breton, D. McCurdy & Sons, Baddeck. Extra.—Specimens of petrifactions, both foreign and Canadian, C. H. Hatch, Kingston; an elk's horn, Alex. Thomson, Caintown.

Class 52.—Ladies' Work (Ornamental).

512 Entries.

Judges.—Mrs. A. G. Gunn, Kingston; Mrs. Henry Wade, Toronto; Miss R. Dickson, Wolfe Island.

Best painting on china, Miss Brown, Toronto. $3 00
2nd do, Miss Maud Betts, Calderwood 2 00
Best painting on Terra Cotta, Miss Machar, Kingston 3 00
Best painting on silk or satin, Mrs. Jos. W. Power, Kingston 3 00
2nd do, Miss K. E. Beemer, Hamilton 2 00
Best painting on wood, Mrs. Mathieson, Toronto 3 00
2nd do, Miss Brown, Toronto 2 00
Best Cretonne work (not pasted), Miss Ella Fraser, Kingston 3 00
2nd do, Miss Nickle, Kingston 2 00
Best fancy work (any kind), by girls under 12 years of age, Miss Minnie Birk, Kingston. 2 00
2nd do, Miss Lander, Yorkville 1 50
Best applique work, Mrs. Mathieson, Toronto 3 00
2nd do, Mrs. Susan Rowdon, Brampton..... 2 00
Best Roman embroidery, Mrs. Susan Rowdon, Brampton..... 3 00
2nd do, Benj. Robinson, Kingston 2 00
Best Oriental embroidery (in silk), Mrs. Macpherson, Strathroy 3 00
2nd do, Miss Georgie Greer, Kingston 2 00
Best ladies' bonnets (collection of), Spence & Crumley, Kingston..... 5 00
Best hair dressers' work, Mrs. G. Richardson, Kingston 3 00
2nd do, Chas. N. Spooner, Glenburnie 2 00
Best plaits for bonnets or hats, Canadian straw, Miss Brown, Toronto 2 00
2nd do, Jno. Hopkins, Mill Haven..... 1 50
Best Crewel work (wool), Benj. Robinson, Kingston 2 00
2nd do, Mrs. Wm. Kirk, Kingston 1 00
Best Kensington work, Miss Annie R. Ford, Kingston 3 00
2nd do, Miss Lucy Betts, Calderwood..... 2 00
Best Berlin wool work (flat), Miss Kate P. Power, Kingston 4 00
2nd do, Mrs. Betts, Calderwood..... 3 00
Best Berlin wool work for framing, Miss E. Paynter, Kingston..... 4 00

2nd best, Saml. D. Swann, Kingston $3 00
Best Berlin wool work, raised, Miss Mary B. Flanagan, Kingston 4 00
2nd do, Miss Willina Macpherson, Kingston. 3 00
Best slippers, pair, worsted work, Miss Sarah Marshall, Kingston 3 00
2nd do, Jas. M. Cooke, Cataraqui 2 00
Best sofa cushion, Mrs. Jos. W. Power, Kingston 3 00
2nd do, Mrs. Harrison, Toronto 2 00
Best netting, fancy, Miss Mary Skinner, Toronto 3 00
2nd do, Mrs. E. Allen, Kingston 2 00
Best mats, wool, Lewis Hartman, Odessa.... 3 00
2nd do, Miss Minnie Keys, Bowmanville 2 00
Best teapot cosey, Miss Silla P. Macallister, Kingston 3 00
2nd do, Mrs. J. C. Clarke, Kingston 2 00
Best chenille work, Miss Folger, Kingston .. 3 00
2nd do, Mrs. Susan Rowdon, Brampton 2 00
Best bead work, A. L. Wilkinson, Kingston.. 3 00
2nd do, Miss Edith Macpherson, Kingston... 2 00
Best carriage afghan, Mrs. W. H. Bell, Prescott 4 00
2nd do, Miss Isabella McLaren, Kingston ... 3 00
Best crochet work (fancy wool), Miss Givens, Toronto 3 00
2nd do, Miss M. Kidd, Kingston 2 00
Best braiding, Miss Anne Douglas, Kingston. 3 00
2nd do, Miss Martha P. Smith, Kingston 2 00
Best bead work (by Indians only), Miss Ivy M. Davy, Kingston 3 00
Best embroidery, on cotton or muslin, Miss Bella Medley, Barriefield..... 3 00
2nd do, Miss Lynch, Kingston 2 00
Best embroidery, on silk or cloth, Miss Folger, Kingston 3 00
2nd do, Mrs. Jos. W. Power, Kingston..... 2 00
Best embroidery, on flannel, Miss McVean, Woodhill 3 00
2nd do, Mrs. Harrison, Toronto 2 00
Best Guipure work, Mrs. Susan Rowdon, Brampton 3 00
2nd do, Miss M. Strickland, Oshawa 2 00
Best tatting, Miss L. Cooper, Kingston.. ... 2 00
2nd do, Mrs. H. T. Hubbell, Kingston 1 00
Best lace (point), Miss Cunningham, London. 3 00
2nd do, Miss M. Strickland, Oshawa 2 00
Best lace (Honiton), Miss Susan Rowdon, Brampton 3 00
2nd do, Mrs. Thos. Smyth, Tormore 2 00
Best Lace (pillow or bobbin) H. Reeve, Kingston 3 00
2nd do, Miss M. McVean, Woodhill 2 00
Best lace, (macrame or twine), Benj. Robinson, Kingston..... 3 00
2nd do, Miss Ede St. Remy, Kingston 2 00
Best wax flowers (coloured), Mrs. Jos. W. Power, Kingston..... 3 00
2nd do, Geo. A. Parrott, Odessa 2 00
Best wax flowers, or design (white), Geo. A. Parrott, Odessa 2 00
2nd do, Edward Richardson, Kingston 1 00
Best wax fruit, C. N. Spooner, Glenburnie .. 3 00
2nd do, Mrs. Calvin Day, Kingston..... 2 00
Best ornamental leather work, Mrs. C. C. Neville, Ottawa 3 00
2nd do, Mrs. J. C. Clarke, Kingston 2 00
Best collection of embroidery, on cotton, silk or cloth—the work of one person—Mrs. W. Keys, Bowmanville .....Diploma
Best collection of lace work, the work of one person, Miss Bella Midley, Barriefield. Diploma

Extra. — White feather wreath, Berlin wool, wreath of flowers, Moses Spafford, Spaffordton; feather wreath, Chas. N. Spooner, Glenburnie; moss scenery, Lewis Hartman, Odessa; oil painting on velvet, A. L. Wilkinson, Kingston; hair picture, Miss Kate P. Power, Kingston; oil painting on velvet, Miss Edith M. Power, Kingston; wax harp, Miss Varney, Kingston; outline work, Miss K. E. Fraser, Kingston; painting on glass, Miss E. H. Ferguson, Kingston; wax work, autumn leaves, Mrs. Jos. W. Power, Kingston; table drape in arrasene embroidery, tidy in outline embroidery, Mrs. Macpherson, Strathroy; table cover, ribbon work, Mrs. Noel Kent, Kingston; tidy in outline, Mrs. Harrison, Toronto; embroidery on linen, Miss Nickle, Kingston; trimmed basket, bracket, embroidered lace, Jas. A. Hardy, Kingston; lace pillow, silk, H. Reeve, Kingston; panels painted in water colours, Miss Georgina Rose, Kingston; card board house, table cloth (outline), bracket do, Miss Edith Macpherson, Kingston; painting on glass, Miss M. R. Ferris, Kingston; wool antimacassar, Mrs. Calvin Day, Kingston; Lord's Prayer in cardboard, Miss Mary Kirkpatrick, Kingston; crotchet and braid work, Miss H. Reeve, Kingston; tatting in wool. Miss L. Evans, Toronto; silk crotchet work, Miss J. Brokenshore, Kingston; embroidery on plush, Miss Annie R. Ford, Kingston.

Class 53.—Ladies' Work (Useful).

285 Entries.

Judges.—Mrs. R. Y. Fish, Linwood; Miss Jane H. Ferguson, Kingston; Miss E. Park, Oriel.

Best machine sewing (family), Miss A. M. Sands, Kingston $3 00
2nd do, Miss McVean, Woodhill..... 2 00
Best hand sewing, Miss Allen and Miss Dupey, Kingston 3 00
2nd do, Miss Anne Douglas, Kingston..... 2 00
Best shirt, man's fine, unwashed, hand-made, Mrs. L. Nelson, Barriefield 3 00
2nd do, Jonathan Knight, Cataraqui 2 00
Best shirt, man's fine, unwashed, machine-made, Geo. A. Rudd, Brockville 3 00
2nd do, Jonathan Knight, Cataraqui 2 00
Best shirt, man's, coarse, unwashed, hand-made, Geo. Edwards, Latimer 2 00
2nd do, Jonathan Knight, Cataraqui 1 00
Best shirt, man's, flannel, hand-made, Miss McVean, Woodhill. 2 00
2nd do, Jonathan Knight, Cataraqui 1 00
Best darning, Miss M. Strickland, Oshawa .. 2 00
2nd do, Miss Brown, Toronto..... 1 00
Best counterpane, crochet, Mrs. L. Nelson, Barriefield 4 00
Best counterpane, knitted, Mrs. Jno. Carr, Sarnia 4 00
Best quilt, patchwork, calico, M. Carroll, Smith's Falls..... 3 00
2nd do, Wm Pennock, Elgin..... 2 00
Best quilt, patchwork, cloth, Mrs. A. Knight, Cataraqui..... 3 00
2nd do, Jonathan Knight, Cataraqui 2 00
Best quilt, patchwork, silk, Miss Anna Sims, Kingston 3 00
2nd do, G. W. Robinson, Kingston 2 00
Best quilt, log cabin, Miss Jane McCulloch, Kingston 3 00
2nd do, Miss McAdam, Kingston..... 2 00
Best gloves, two pairs, coarse, hand-made, Miss M. Strickland, Oshawa..... 2 00
2nd do, Mrs. W. H. Bell, Prescott..... 1 50
Best gloves, two pairs, fine, hand-made, Miss Nancy Strickland, Oshawa 2 00
Best mitts, two pairs, coarse, hand-made, Mrs. W. H. Bell, Prescott..... 2 00

2nd best, Mrs. Jno. Carr, Sarnia $1 50
Best mitts, two pairs, fine, hand-made, Miss Nancy Strickland 2 00
2nd do, Mrs. Jno. Carr, Sarnia 1 50
Best knitted stockings, two pairs, wool, hand-made, Mrs. Thos. Drummond, Kingston. 3 00
2nd do, Mrs. W. H. Bell 2 00
Best knitted socks, two pairs, wool, hand-made, Mrs. W. H. Bell, Prescott 2 00
2nd do, Mrs. Renton, Kingston 1 50
Best stockings, two pairs, fancy cotton, hand-made, Mrs. W. H. Bell, Prescott 3 00
2nd do, Miss M. Strickland 2 00
Best knitted shirt, man's, hand-made, Miss M. Strickland 3 00
Best knitting, fancy wool, Mrs. Jno. Carr, Sarnia 3 00
2nd do, Mrs. Thos. Drummond 2 00
2nd prize, knitted drawers, man's, hand-made, Mrs. Jane McCullogh, Kingston 2 00
Best tidy, crochet, cotton, Mrs. L. Nelson, Barriefield 2 00
Best tidy, knitted, cotton, Mrs. Jno. Carr, Sarnia 2 00
2nd do, Mrs. Harrison, Toronto 1 00
Darned net, Mrs. Susan Rowdon, Brampton. 2 00
Lambrequin, Mrs. Judge Harrison, Toronto. 3 00
Table valance, Mrs. Susan Rowdon, Brampton 3 00
Skeleton leaves, Miss Carberry, Kingston.... 2 00
Fancy jars, Miss Brown, Toronto 3 00

Extras.—Diploma: quilt, patchwork, cloth, Mrs. J. L. Turquand, Toronto; lady's wool shawl (crochet and knitting combined), Mrs. Jno. Carr, Sarnia; knitted wool jacket, tidy, knitted, linen, and two pairs knitted silk stockings, Mrs. Thos. Drummond, Kingston; collection of old china, Mrs. H. T. Hubbert, Kingston; pair horse nets and two hammocks, Miss Percival, Wolfe Island; splasher, Miss Jane McCullogh, Kingston; child's dress, Miss Georgie Grier, Kingston; scrap-book, Miss Jane McCausland, Toronto; two infants' robes, Mrs. T. W. Irwin, Kingston; tinsel lambrequin, Mrs. Judge Harrison, Toronto.

Class 54.—Chemical Manufactures and Preparations.

12 Entries.

Judges.—Prof. Fowler, Kingston; Dr. Honeyman, Halifax, N. S.

Best collection of fancy soaps, T. W. Nichols, Toronto $4 00

Extras.—Dom. Bronze Medal: Artificial limbs, Toronto Artificial Leg and Arm Co. Diploma: Turner's tonic bitters, Robt. Turner, Brantford. Extra: Harness dressing, erasive paste, electric belts, G. B. Briggs & Sons, Hamilton; Putnam's painless corn extracter, N. C. Polson & Co., Kingston; phosphate of lime and its manufacture, The Fertilizer Co. of Canada, Guelph.

Class 56.—Building Materials, Painting, Work in Marble, &c.

15 Entries.

Judges.—Thomas Johnston, Hamilton; M. Newlands, Kingston.

Best bricks, pressed, 1 doz., W. J. Norris & Co., Kingston $2 00
Best bricks, kiln burnt, 1 doz., W. J. Norris & Co., Kingston $2 00
Cements, best assortment, for building purposes, W. J. Norris & Co., Kingston 6 00
Best sewerage pipes, stoneware, assortment of, W. J. Norris & Co., Kingston 8 00
Best sign painting, Wm. Robinson & Son, Kingston 5 00
Best stoneware, an assortment, Hart Bros. & Lazier, Belleville 8 00

Extras.—Water cooler, Hart Bros. & Lazier, Belleville; plaster of Paris, raw and manufactured, W. J. Norris & Co., Kingston; 12 cans mixed paint, C. Miller & Co., Toronto.

Class 57.—Cabinet Ware and other Wood and Hair Manufactures.

86 Entries.

Judges.—Charles James, Napanee; John Hogg, Paisley; John Shields, Vankleek Hill.

Best bedroom furniture, set of, J. Gibbard & Son, Napanee $12 00
2nd do., W. M. Drennan, Kingston 6 00
Best centre table, W. M. Drennan, Kingston. 6 00
Best coverings for drawing-room furniture, an assortment, W. M. Drennan, Kingston.. 4 00
2nd do., J. Gibbard & Son, Napanee 2 00
Best drawing-room furniture, set of, J. Gibbard & Son, Napanee ....Dom. Bronze Medal and 10 00
2nd do, W. M. Drennan, Kingston 10 00
Best scroll and fretwork, Miss Carberry, Kingston 4 00
2nd do, J. R. Rattenbury, Kingston..... 2 00
Best sideboard, W. M. Drennan 8 00

Part 2.—*Joiners' Work and Machine Work.*

Best clothes wringer, Hamilton Industrial Works, Hamilton 3 00
Best mangle, Hamilton Industrial Works, Hamilton 3 00
Best pleasure skiff, C. L. Curtis, Kingston.. 5 00
Best rowing boat., H. H. Tomlinson, Kingston 5 00
Best washing machine, Lee Porter, Gurd & Co., agents, Toronto 3 00
Best willow-ware, six specimens, W. M. Drennan, Kingston 4 00

Extras. — Diploma: Assortment cane handle cricket bats, dove-tailed handle bats, assorted, wickets, baits, &c., William Peacock, Montreal; steam yacht, model, high draft, David Jones, Kingston; cabinetmakers' and joiners' tool chest, James T. Jarvis, Smith's Falls. Extra: folding lap board, baskets, whisk-holders, music rolls, shawl-strap, and bread cutter, J. W. Van Dyke, Grimsby; fancy walking cane, cut out with pen knife, W. R. McRae, Kingston; collection of swings, Wm. H. Phillips, Watford.

Class 58.—Machinery and parts thereof and Tools.

50 Entries.

Judges.—John Wade, Port Hope; Harold Barret, Port Hope.

Part 1.—*Steam Engines, Hydraulic Machinery.*

Best portable steam engine for agricultural purposes, not less than six horse power, to be put in operation on the ground, John Abell, Woodbridge..... Dom. Gold Medal
2nd do, Haggert Brothers' Manufacturing Company, Brampton..... $20 00
Best pump, double acting, lift or force, J. Brokenshire, Kingston..... 4 00
Best pump, force, for hand use, Ontario Pump Company, Toronto..... 4 00
Best pump, wooden, Ontario Pump Company, Toronto..... 4 00
2nd do, C. H. Wartman, Colebrook..... 2 00
Best steam engine governor, Judson & Son, Rochester, N. Y..... 4 00
Best water-wheel, J. C. Wilson & Company, Picton..... 12 00

Extras.—Dom. Silver Medal: Traction engine, steam separator, Haggart Brothers' Manufacturing Company, Brampton. Extra: Horse-power for threshing purposes, Stevens, Turner & Burns' Manufacturing Company, London; Davis' patent propeller-wheel, D. M. Ewen & Company, Kingston.

Part 2.—*Metal Working Machinery, and Machinists' Tools, etc.*

Best drills, taps, dies and rimmers, assortment of, Butterfield & Company, Rock Island, Que..... 4 00
Best files, an assortment of, Thos. Graham & Company, Toronto..... 4 00

Extras.—Diploma: Assortment nail hammers, Guelph Carriage Goods Company, Guelph.

Part 3.—*Woodworking Machinery.*

Extra.—Pair patent elastic couplings, Chas. Barber, Meaford.

Part 4.—*Mill and Factory Machinery, and Miscellaneous Articles.*

Best car-coupling (railroad), J. W. VanDyke, Grimsby..... 4 00
Best knitting machine (hand), Creelman Brothers, Georgetown..... 4 00
Best printing press (power or treadle), Golding & Company, Boston, Mass..... 4 00

Class 60.—Mechanical Metal Work (Miscellaneous).

50 Entries.

Judges.—James B. Saunders, Farmersville; Wm. Gray, Hawthorne; John Keller, Waterloo.

Part 1.—*Hardware, Cutlery, Bells, Safes, Scales, etc.*

Best bells, church and school, assortment of, Guelph Carriage Goods Company, Guelph $6 00
Best malleable hardware, assortment, P. Kyle, Merrickville..... 8 00
Best horse-shoe nails, 20 lbs., William Mooney & Company, Montreal, per A. Chown, agent, Kingston..... 4 00
Best skates, an assortment, Rawbone Gun & Manufacturing Company, Toronto..... 4 00
2nd do, Star Manufacturing Company, Halifax, N. S..... 2 00
Best railroad supplies, assortment, N. L. Piper & Son, Toronto..... $6 00

Extras.—Dom. Silver Medal: Locomotive frame and driving axles, Nova Scotia Forge Company, New Glasgow, N. S. Bronze Medal and Diploma: Collection of bird cages (Japanned and brass), bracket and stand lamp (cast iron), tubular lanterns, and Cooke's sash supporter and lock.

Part 2.—*Gold, Tin, and Coppersmiths' Work, Locks, etc.*

Best fire-arms, assortment, Winchester Repeating Arms Company, New Haven, Conn., per Charles Stark, agent, Toronto 6 00
2nd do, Rawbone Gun & Manufacturing Company, Toronto..... 4 00
Best rifle, breech-loading, W. H. Greener, London, Eng., per Rawbone Manufacturing Co., Toronto..... 4 00
Best tinsmith's work, assortment, Chown & Cunningham, Kingston, agents for Lalance & Grosham..... 4 00

Extras.—Dom. Bronze Medal: breech-loading gun implements, Rawbone Gun and Manufacturing Company, Toronto. Highly Commended; Window shade clasp, Toronto Industrial Works Company, Toronto; the twin spring, C. A. Robins, Lacrosse, Wis., U. S.

Part 3.—*Instruments.*

Extras.—Dom. Bronze Medal: Caligraph, or hand printing machine, A. J. Henderson, agent, Toronto. Commended: Fruit dryer, Thos. Martindale, York; display of agate ware, Chown & Cunningham, agents for Lalance & Gosham, New York. Extra: Electro curative appliances, Addison Norman, Toronto; Alaska pebble spectacles and eye glasses, J. L. Leon, New York, N. Y., U. S.

Class 61.—Stoves and Castings.

50 Entries.

Judges.—T. Moffatt, Tayside; W. McLeish, South Finch; P. R. Randall, Port Hope.

Best set of car wheels, Gartshore Car Wheel Manufacturing Company, Toronto..... $4 00
Best castings for railway cars and engines, Gartshore Car Wheel Manufacturing Company, Toronto..... 10 00
Best cast iron work (ornamental) for fences, etc.; Chown & Cunningham, Kingston... 6 00
Best cooking range (portable), Chown & Cunningham, Kingston..... 6 00
2nd do, Oshawa Stove Company, Oshawa.... 4 00
Best cooking stove (for wood), Chown & Cunningham, Kingston..... 6 00
2nd do, Oshawa Stove Company, Oshawa.... 4 00
Best cooking stove (for coal), Oshawa Stove Company, Oshawa..... 6 00
Best furniture for cooking stove (one set), Chown & Cunningham, Kingston..... 4 00
Best hall stoves (for wood), Chown & Cunningham, Kingston..... 4 00
2nd do, Oshawa Stove Company, Oshawa.... 2 00
Best hall stove (illuminated base burner), Oshawa Stove Company, Oshawa..... 4 00
2nd do, Thos. Lemon, agent, Kingston, for Copp & Company..... 2 00
Best hot air furnace (for coal), Oshawa Stove Company, Oshawa..... 6 00

Best hot air furnace (for wood), Chown & Cunningham, Kingston. $4 00
Best parlour stove (for wood), Chown & Cunningham, Kingston..... 4 00
2nd do, Oshawa Stove Company..... 2 00
Best parlour stove (for coal), Oshawa Stove Company..... 4 00
Best parlour cooking stove, Chown & Cunningham, Kingston..... 4 00
Best parlour grate, Oshawa Stove Company.. 4 00
Stoves, ranges, and hollow ware, best and largest display, Chown & Cunningham, Kingston.....Dom. Bronze Medal

Extras.—Dom. Bronze Medal: Cast iron sinks with feet and drawers, assortment of roof crestings, ornamental iron railing, samples of iron door guards, and double box stove, Chown & Cunningham, Kingston. Highly Commended: Steam cookers, and coffee heater, International Supply Company, Toronto. Extra: "Ruby" oil stove, Oshawa Stove Company, Oshawa; hot air heating apparatus and connections, N. McNeil, Kingston.

Class 62.—Saddle, Harness, and Trunkmakers' Work, and Engine Hose and Belting.

30 Entries.

Judges.—Rea Dickson, Port Hope; Geo. Lucas, Coles' Corners.

Part 1.—*Saddlery, etc.*

Best Collars, an assortment, D. A. Waddell, Kingston 4 00
Best Harness, set of double carriage, Geo. A. Rudd, Brockville..... 6 00
2nd do, D. A. Waddell. 4 00
Best harness, set of single carriage, Geo. A. Rudd, Brockville..... 6 00
2nd do, D. A. Waddell..... 4 00
Best harness, set of team, Geo. A. Rudd, Brockville 6 00
2nd do, D. A. Waddell..... 4 00
Best leather machine belting, an assortment, Ford & Sons, Kingston..... 6 00
Best saddle, lady's, D. A. Waddell, Kingston 6 00
Best saddle, gentleman's, plain shaftoe, D. A. Waddell..... 5 00
Best whips, an assortment, A. Chown, Kingston, Agent Hampden Whip Co., Mass.. 4 00
Best whip thongs, an assortment, A. Chown, Kingston, Agent Hampden Whip Co., Mass 2 00

Part 2.—*Saddle and Harness Stock.*

Best brown strap and bridle, two sides of each, Ford & Sons, Kingston..... 4 00
Best carriage cover, two skins, whole, Marlatt & Armstrong, Oakville 4 00
Best enamelled cloth, Goodyear Rubber Co., Montreal 4 00
Best harness, leather, two sides, Ford & Sons, Kingston 4 00
Best horse blankets, two pairs, F. M. Campbell, Latimer 4 00
2nd do, D. A. Waddell, Kingston..... 2 00
Best lace, leather, 30 lbs., Ford & Sons, Kingston 4 00
Best skirting for saddles, two sides, Ford & Sons, Kingston 4 00
Best display of saddle and harness leather, Ford & Sons, Kingston ...Dom. Bronze Medal

Extras.—Diploma: Assortment of Coleman's Trace Buckles, V. A. Coleman, Port Hope; belt leather, Ford & Sons, Kingston.

Class 63.—Shoe and Boot Makers' Work and Material.

32 Entries.

Judge.—H. M. Rose, Port Hope.

Part 1.—*Boots, etc.*

Best boots, ladies', hand-made, an assortment, A. Sutherland, Kingston $6 00
Best boots, gentlemen's, hand-made, an assortment, A. Sutherland, Kingston..... 6 00
Best boots, gentlemen's, machine-made, an assortment, A. Sutherland, Kingston.. 6 00
Best boots, ladies', machine-made, an assortment, A. Sutherland..... 6 00
Best boots, men's, single pair, hand-made, A. Sutherland..... 4 00
Best children's shoes, assortment, A. Sutherland..... 4 00
Best gaiters, Balmorals, Oxford ties, etc., hand-made, assortment, A. Sutherland.. 6 00
Best gaiters, Balmorals, Oxford ties, etc., machine-made, assortment, A. Sutherland.. 6 00
Best assortment boots and shoes of Canadian manufacture, A. Sutherland, Dom. Bronze Medal
Best boot and shoe uppers, assortment, A. Sutherland 4 00

Part 2.—*Shoemakers' Tools and Stock.*

Best calf-skins, 1 dozen, Ford & Sons, Kingston 4 00
Best calf-skins, grained, 1 dozen, Ford & Sons, Kingston 4 00
Best calf-skins, Morocco, 1 dozen, Ford & Sons..... 4 00
Best Cordovan, two skins, Ford & Sons..... 2 00
Best cow, buffed, two sides, Ford & Sons.... 2 00
Best cow, pebbled, two sides, Ford & Sons .. 2 00
Best dog skins, two, dressed, Jas. P. Lake & Sons, Morven..... 2 00
Best kip, two skins, Ford & Sons..... 2 00
Best kip, grained, two sides, Ford & Sons.... 2 00
Best leather, kinds not otherwise described, assortment, Ford & Sons 4 00
Best linings, six skins, Russet, Ford & Sons.. 2 00
Best sole leather, two sides, slaughter, Ford & Sons 2 00
Best splits, two sides, Ford & Sons..... 2 00
Best upper leather, two sides, Ford & Sons.. 2 00
Best upper leather, grained, two sides, Ford & Sons 2 00

Extra.—Diploma: Leather dressings and blackings, A. Sutherland, Kingston.

Class 64.—Wearing Apparel and Furs, Flax, Hemp, and Cotton Goods.

75 Entries.

Judges.—Alex. Fraser, Tayside; John B. McKenzie, Ottawa.

Part 1.—*Wearing Apparel.*

Best caps, cloth, assortment, Mills Bros., Kingston 4 00

Best collars and cuffs, Mills Bros., Kingston.	$2 00
Best gloves and mitts of leather, Mills Bros..	4 00
Best gloves and mitts of kid, Mills Bros.....	4 00
Best gloves and mitts, woollen, Mills Bros...	4 00
Best hats, felt, assortment, Mills Bros.....	4 00
Best hats, silk, Mills Bros.....	4 00
Best overcoat, of Canadian cloth, Z. Prevost, Kingston	4 00
2nd do, A. H. Gillis, Chatham, N.B.....	2 00
Best shirts, gentlemen's, assortment, Mills Bros.	3 00
Best made gentleman's suit, Canadian cloth, Z. Prevost, Kingston....	5 00
2nd do, A. H. Gillis, Chatham.....	3 00

Part 2.—*Furs.*

Best furs, set of ladies', Canada mink, Geo. Mills & Co., Kingston.....	4 00
2nd do, Mills Bros.....	2 00
Best furs, set of ladies' seal, Geo. Mills & Co., Kingston	6 00
2nd do, Green, Sons & Co., Montreal.....	4 00
Best furs, set of ladies' lambskin, Geo. Mills & Co.	6 00
2nd do, Green, Sons & Co., Montreal.....	4 00
Best furs, set of ladies', any other kind, Geo. Mills & Co.....	4 00
2nd do, McLean, Shaw & Co., Montreal	2 00
Best furs, set of gentlemen's, Mills Bros.....	6 00
2nd do, Geo. Mills & Co.....	4 00
Best collection of manufactured furs, Geo. Mills & Co.....Dom. Bronze Medal	
Best fur sleigh robes, assortment, not less than three kinds, Mills Bros.....	6 00
2nd do, Geo. Mills & Co., Kingston..... ..	4 00
Best sheepskin mats, dressed and coloured, assortment, W. J. Robinson, Toronto.....	4 00
2nd do, Mills Bros..... ..	2 00

Part 3.—*Flax and Hemp Goods.*

Best linen, unbleached, three pieces, Mrs. Julian Weegar, Aultsville....	6 00

Part 4.—*Cotton Goods.*

Best beam warps, assortment, Hamilton Cotton Co., Hamilton.....	4 00
Best calico, unbleached, three pieces, Kingston Cotton M'nf'g Co., Kingston.....	6 00
Best assortment of cotton goods manufactured in Canada, Wm. Parks & Son, St. John, N.B.....Dom. Silver Medal	
2nd do, Hamilton Cotton Co.	
Best yarns, assorted colours, 3 lbs. each, Wm. Parks & Son, St. John, N.B..... ..	2 00
2nd do, Hamilton Cotton Co.....	1 00
Best cotton yarns, assortment of, Hamilton Cotton Co.	6 00
2nd do, Wm. Parks & Son, St. John, N.B..	4 00

Extras.—Dom. Gold Medal: For display of tents, folding camp-bed, folding camp cot, folding camp-chair and table, flags, hammocks, and waterproof waggon covers, &c., National Manufacturing Co., Ottawa. Diploma: For carpet warp, thread warp, denims, plain and fancy, cottonades, ball knitting cotton, hosiery and yarn, Hamilton Cotton Co., Hamilton. Highly Commended: Cottonades (demmisette), Dundas Cotton Mills Co., Dundas; Scotch tweed suit and West of England overcoat, Z. Prevost, Kingston; mosquito nets, National Manufacturing Co., Ottawa. Extra: 2 pairs of West of England pants, Z. Prevost, Kingston; folding camp stove and kit, with oven, National Manufacturing Co., Ottawa. Mills Bros., Kingston, were awarded a diploma in addition to other prizes, for their exhibit.

Class 65.—Woollen Goods.

95 Entries.

Judges.—L. L. Price, Hinch; K. Y. Fish, Linwood; Wm. Richardson, M.P.P., Seeley's Bay.

Part 1.

Best blankets, white, two pairs, Wm. Dawson & Son, Collin's Bay	$6 00
2nd do, P. E. & W. E. Ward, Kingston....	4 00
Best Cashmere, assorted, 3 pieces, Boyd, Caldwell & Co., Lanark.....	6 00
Best counterpanes, woven, P. E. & W. E. Ward, Kingston.....	3 00
2nd do, F. M. Campbell, Latimer.....	2 00
Best doeskins, assorted, three pieces, Boyd, Caldwell & Co., Lanark.....	6 00
Best satinets, assortment, three pieces, Moorhouse, Dodds & Co., Glen Tay.....	6 00
Best tweeds, winter, assortment of, six pieces, Moorhouse, Dodds & Co.....	6 00
2nd do, Boyd, Caldwell & Co., Lanark	4 00
Best tweeds, summer, assortment of, six pieces, Moorhouse, Dodds & Co.....	6 00
2nd do, Boyd, Caldwell & Co.....	4 00
Best assortment of Canadian tweeds, Moor house, Dodds & Co.....Dom. Silver Medal	

Extra.—Gold Medal in lieu of prizes awarded for cotton yarns, and assortment of yarns for manufacturing purposes, from Canadian wools, &c., McCrae & Co., Guelph.

Part 3.—*Carpets, etc.*

Best carpets, three pieces, Wm. Pennock, Elgin	$6 00
Best carpet, stair, three pieces, Hiram Smith, Westbrook.....	6 00
Best rag carpets, Wm. Pennock, Elgin	3 00
2nd do, Mrs. Swain, Kingston	2 00
Best rag mats, Mrs. John Craig, Kingston...	3 00
2nd do, D. Bole, Garden Island..... ...	2 00
Best carriage rugs, three pieces, W. J. Robinson, Toronto.....	4 00

Part 4.—*Domestic Woollens from Home Spun Yarn.*

Best cloth, fulled, farmers' make, piece not less than 20 yards, C. T. Lane, Warkworth	$4 00
2nd do, Wm. Pennock, Elgin.....	2 00
Best flannel, not factory made, Wm. Pennock	4 00
Best yarn, white and dyed, not factory made, Arch. Knight, Cataraqui..... ..	2 00
2nd do, F. M. Campbell, Latimer.....	1 00
Best yarn, fleecy, woollen, not factory made, J. L. P. Gordanier, Morven.....	2 00
2nd do, C. T. Lane, Warkworth..... .	1 00
Best woollen shawls, home made, Mrs. W. H. Bell, Prescott.....	3 00
2nd do, Mrs. Lawrence, Loughboro'	2 00
Best blankets, home made, Wm. Pennock, Elgin.....	3 00
2nd do, Wm. Lawrence, Loughboro'..	2 00

Extras.—Wool mat, home spun yarn, Allen Bond, Inverary; wool mat, home spun yarn, George Edwards.

Class 66.—Groceries and Provisions.

55 Entries.

Judges.—Oliver Austin, Simcoe; Wm. Deeks, County Dundas.

Best biscuits, collection of, Christie, Brown & Co., Toronto....Dom. Bronze Medal and $4 00
Best bottled fruit, assortment, manufactured for sale, David Nicol, Cataraqui 4 00
2nd do, Thos. Beall, Lindsay 2 00
Best bottled pickles, an assortment manufactured for sale, R. Varney, Kingston..... 4 00
2nd do, Jonathan Knight, Cataraqui 2 00
Best buckwheat flour, 25 lbs., J. D. Lutz, Stoney Creek 3 00
2nd do, J. L. P. Gordanier, Morven..... 2 00
Best canned meats, an assortment, Aylmer Canning and Evaporating Co., Aylmer. .....Dom. Silver Medal and 6 00
Best cigars, Canadian manufacture, assortment, S. Oberudorffer, Kingston..... 4 00
Best cigars, best made and flavoured, single box, S. Oberudorffer, Kingston..... 4 00
Best confectionery, fancy, Cadbury Bros., Montreal 4 00
Best Indian corn meal, 25 lbs, J. D. Lutz, Stony Creek 3 00
2nd do, R. T. Macdonald, Cataraqui 2 00
Best salt, one barrel coarse Canadian, North American Chemical Co., Goderich..... 4 00
Best salt, one barrel fine Canadian, North American Chemical Co., Goderich. 4 00
Best salt, 30 lbs., table or dairy, Canadian, North American Chemical Co..... 3 00
Best sauces for table use, an assortment, manufactured for sale, David Nicol, Cataraqui..... 4 00
2nd do, Richard Varney, Kingston..... 2 00
Best tobacco, smoking, best assortment, S. Oberudorffer, Kingston 4 00
Best tobacco, chewing, best assortment, S. Oberudorffer, Kingston 4 00
Best vegetables, hermetically sealed, Aylmer Canning and Evaporating Co 4 00
Best wheat flour, 50 lbs., J. L. P. Gordanier, Morven..... 4 00
2nd do, D. H. McMillan, Winnipeg, Man ... 2 00

Extras.—Dom. Bronze Medal: Canadian Dairy Salt, North American Chemical Co., Goderich. Diploma: For Cocoa Essence and pure Chocolates, Thorley's improved horse and cattle food, Thorley Horse and Cattle Co., Hamilton. Highly commended: Princess Baking Powder, Wm. Lunan & Son, Sorel, Que. Extra: Crab apple Jelly, Chili sauce, crab apple preserves, Mr. John Craig, Kingston: millet flour, 25 lbs., R. C. Macdonald, Cataraqui; Tomato Catsup, Miss Lynch, Kingston; white wine vinegar, cider vinegar, pickling vinegar, Hoaz Brothers, Kingston.

Class 67.—Essays.

The Council of Agriculture and Arts offered special prizes this year for essays on the following subjects, viz. :—

1. Manures: Their preparation, application and effect on growing crops, and in maintaining and increasing the fertility of the soil to which they are applied.

Competition on this subject restricted to practical farmers cultivating land within the Province of Ontario.

2. The Homestead: Its arrangement and surroundings, with regard to convenience and comfort, combined with economy, healthfulness and picturesque appearance; including choice of site, dwelling-house and offices, water-supply, drainage, farm buildings, shelter-belts, gardens and shrubbery.

Open to general competition.

9 Entries.

Judges.—Professor Mills, Ontario School of Agriculture, Guelph; Professor W. Johnston, Toronto.

Best essay on Manures, J. Smith, Jr., Ratho, $30 00
2nd do, M. McQuade, Egmondville..... 20 00
Best essay on the Homestead, David Nicol, Cataraqui 30 00
2nd do, John McClure, Brampton..... 20 00

Class 68.—Prize Farms.

23 Entries.

Judges.—John I. Hobson, Mosborough; John P. Bull, Downsview.

Prize farm competition, group No. 3, comprising the following Electoral District Societies, viz.:—North Bruce, South Bruce, North Grey, East Grey, West Huron, South Huron, North Perth, South Perth, Centre Wellington, South Wellington.

James Dickson, Seaforth P.O., Tp. Tuckersmith, Co. Huron, Gold Medal.

Geo. Hyde, Shakespeare P.O., Tp. North Easthope, Co. Perth, 1st Silver Medal.

Andrew Waechter, Walkerton P.O., Tp. Brant, Co. Bruce, 2nd Silver Medal.

Walter Sorby, Guelph P.O., Tp. Puslinch, Co. Wellington, Bronze Medal.

Wm. Elgie, Barnet P.O., Tp. Nichol, Co. Wellington, Bronze Medal.

Alex. McLaren, Cromarty P.O., Tp. Hibbert, Co. Perth, Bronze Medal.

John Varcoe, Carlow P.O., Tp. Colborne, Co. Huron, Bronze Medal.

Wm. Esplin, Burgoyne P.O., Tp. Arran, Co. Bruce, Bronze Medal.

John Ford, Markdale P.O., Tp. Artemesia, Co. Grey, Bronze Medal.

Robt. Linn, Kilsyth P.O., Tp. Derby, Co. Grey, Bronze Medal.

MANITOBA EXHIBIT.

The following Diplomas were awarded the Manitoba Exhibits:—

Collection of grain, Brown & Oldfield, Winnipeg.

Collection of grains, grasses and soil from Mennonite Reserve, Mr. Hespeler, Winnipeg.

Collection of garden vegetables, S. J. Jackson, Stonewall.

Collection of farm products, James Riddle, Lintrathen,

Collection of roots and vegetables, Kennith McKenzie, Burnside.

Collection of vegetables and sunflowers, Lt.-Col. W. Osborne Smith, C.M.G., Winnipeg.

Collection of furs, Hudson's Bay Company, Winnipeg.

Collection of vegetables, W. G. Fonseca, Winnipeg.

Collection of vegetables, A. M. Brown, Winnipeg.

Collection of wheats, Peter Campbell, The Boyne.

In addition to the above, a Diploma was awarded Mr. Acton Burrows, Deputy Minister of Agriculture and Statistics, for the exhibit as a whole.

ADDENDA.

REPORT OF THE SECRETARY AT THE DECEMBER MEETING IN 1882, *RE* CHICAGO FAT STOCK SHOW, HERD BOOKS, ETC.

To the President and Members of the Council:

DEAR SIRS,—Since our last meeting in Kingston, I have had a good deal of correspondence with Mr. J. H. Pickerell, of the American Shorthorn Breeders' Association, asking if our Council would consolidate our Herd Book with the new one now being started by them; also a circular from the Galloway Breeders, to meet them in convention at Chicago, during the Fat Stock Show, held there from Nov. 16th to 23rd.

After consultation with Mr. Drury, who, when attending a committee meeting here a few weeks ago, decided he could not see his way clear to go up in time to act as a judge, and appointed Mr. G. F. Frankland, the well known shipper of cattle, to go in his place, and we then concluded, if possible, both to go up as delegates and attend the Breeders' meeting to take place the second week of the show. Unfortunately both for me and the Association, our President, after starting and getting as far as Hamilton, concluded not to go further on account of illness, so I had to go alone, very much to my regret.

My first business conference was with Mr. Pickerell, Emory Cobb and C. A. De Graff, the American breeders who were appointed to confer with the proprietors of the various Herd Books on the American continent. I explained to them that our Council had not had a regular meeting since the receipt of their letter, and, therefore, had not considered the matter, but that it was my impression that the Council would not consolidate with them, for the reason that our smaller breeders would not be able to buy three or four volumes of their Herd Book in a year, and that as our book was the oldest in this Province, the breeders would still look to us for registration.

I also attended the meeting of the Breeders on Wednesday evening, the 22nd, at the Grand Pacific Hotel, when it was announced that they had bought out the copyright, stock and goodwill of the American Shorthorn Herd Book, from Messrs. Allen & Bailey, for the sum of $25,000 cash, and that they intended taking that book for their starting point, and to continue it under its present name out of compliment to the veteran Shorthorn man—Hon. Lewis F. Allen. It was also explained that the committee had previously bought the Ohio and Kentucky Herd Books for the sum of $13,000, and were now in the proud position of stating that they had now the control of all the Shorthorn Herd Books in the United States of America, for the sum of $38,000. They then went to work and enlarged their capital stock from $5,000 to $20,000, and quite a large amount of it was subscribed during the evening. I subjoin the report given to that meeting:—

"We the undersigned Committee, appointed to confer with the proprietors of the various Shorthorn Herd Books of America, would respectfully report that, owing to the fact that the Councils of the British American Shorthorn Association, and that of the Agricultural and Arts Association of Ontario, has had no formal meeting, we have had no official communication from them. Messrs. Allen & Bailey have made a formal proposition in writing, which we herewith submit, with the recommendation that it be accepted.

"J. H. PICKERELL, *Chairman.*
EMORY COBB.
C. A. DE GRAFF."

The amount to be paid to Messrs. Allen & Bailey was mentioned before.

The rules of entry for the new Herd Book, are as follows:—

1st.—Pedigrees shall give the name, colour, sex, date of birth, name and address of breeder and owner, and full pedigree, with, when practicable, volume and page of record of the last dam recorded.

This rule is precisely the same as our own.

2nd.—The animal must trace on the side of its sire and dam to imported English Shorthorns, or to pedigrees, not false or spurious, already of record in one or the other of the present Herd books.

Now this rule is not so straight-laced as our British American confrères, and would admit all the pedigrees of our book under the old standard, so, after all, the breeders of the United States are not quite so particular as we have been led to believe they were, or that it was part of a scheme to close us all up.

3rd.—On and after January 1st, 1884, imported animals must be of record themselves, or have sire and dam recorded, in the English Herd Book.

This is a very good rule.

4th.—On and after January 1st, 1885, no animal, except imported animals, shall be eligible whose sire and dam are not already recorded.

Here is a rule with a vengeance, and it is intended, no doubt, to wipe out our books, as they well know that a great many of our Canadian cattle are sold in the United States, and that if they are not all registered in their collossal book before the 1st of January, 1885, they will not be eligible for entry after. This rule will have to be changed.

5th.—Pedigrees of bulls shall be printed in full, unless there be more than one of the same pedigree on the same or opposite page to which reference may be made. Bulls shall be recorded in alphabetical order, and shall not be re-entered, except to correct material error in first entry, and the corrected entry shall have a new number, to which reference shall always be made.

This rule is substantially the same as our own.

6th.—No female shall be eligible until she has had produce, and any cow may be re-entered, giving all her produce, if any, since last entry.

The first part of this rule would be absurd for us to adopt, and would be against the interest of the breeders, also, as the advertisement in our present system of publishing a book every year, would be lost. The last clause is a very good one, and now that we are publishing the cows under the name of the owners, is one that we should encourage in the future.

7th.—Cows should be entered under their owners' names in alphabetical order, and no charge shall be made for produce under dams, which shall be furnished as far as known.

This rule is identically the same as ours.

8th.—Pedigrees of cows may be abbreviated by reference to complete pedigree and the same owner's name, and in the same volume.

This is substantially the same as we have adopted in our fifth and sixth volumes.

9th.—All bulls appearing in the lineage of animals sent for record, must be recorded in full, with proper numbers, in this book, except such as have been correctly recorded in the American Shorthorn Herd Book (this read before the purchase of Allen's book, the "American Shorthorn Record," but that book is now dead), and the pedigrees of all reference bulls not so recorded, must be sent in full, with the numbers by which they have been recorded in any other book.

10th.—There shall be separate and alphabetical indices of cows and owners in each volume.

Just the same as ours.

11th.—The fee for recording pedigrees, shall be fifty cents each. *Since raised to one dollar.*

I think they must have had our fifth volume before them, when they made the last two rules. I must also say that as soon as the arrangements were made with Messrs. Allen & Bailey, they commenced taking orders for complete sets of the American Herd Book, at $50.00 per set, just half the price Mr. Allen charged for them, and in this way expected to make several thousands of dollars, as there were a number of complete sets in stock, thus showing what a progressive people the Americans are; somewhat different to the treatment we received from the breeders of this country in their negotiations for our Herd Book.

There was also a meeting of Polled Angus Breeders the same evening, at the same hotel, where there was ample room and every luxury for guests.

The next day, Thursday, the 23rd of November, an informal meeting of Galloway Breeders was held at the Sherman House, at 11 o'clock a.m., at which I was present, also Mr. David McCrae (one of our ex-members of this Council), and several influential breeders of the Galloways, when a general discussion took place, preparatory to the larger meeting that was to take place in the evening. I had a quantity of entry forms for our Galloway Herd Book, which I distributed, and took every occasion I could, to forward its interests. Mr. McCrae made a capital address, both then and in the evening, and he seems to have the interest of those fine animals at heart, and there is certainly quite a boom in that bred over there.

The evening meeting was in the same place; the following gentlemen were present. I give these names in full, to show you that our interests will be advanced, if we agree to the proposition made by them, or rather what I thought the Council would consent to do for our mutual interests.

J. N. Smith, Bath, Mich.; H. G. Gue, Des Moines, Ia.; Leonard Bros., Mount Lebanon, Mo.; W. Wanzer, Coortburg, Wis.; Peter Davy, Waukesha, Wis.; A. A. Bryan, Montezama; J. B. Lutz, Lafayette, Ind.; N. H. Holton, Marshall, Mich.; R. B. Caruss, St. John's, Mich.; L. L. & W. B. Hall, Wakeman, O.: Robert Parker, Abingdon, Ill.; D. McCrae, Guelph, Ont.; A. Palmer, Boscobee, Wis.; Simon Martin, Eldora, Ja.; Jno. Perkins, Eldora, Ia.; Abnu Graves, Dow City, Ia.; Z. R. Ashbaugh, Hillsdale Mich.; I. I. Brush, Lansing, Mich.; L. R. Geddings, Downie's Grove, Ill.; L. A. Brown, Pentwater, Mich.; I. I. Mitchell, Chicago, Ill.; Simon Beattie, Annan, Scotland; P. S. Norris, Lamville, Ill.; T. L. Stormont, Kirkwood, Ill.; E. W. Perry, Chicago, Ill.

The following resolution, after being carefully debated, was adopted :—

"Whereas—We, breeders of Galloway cattle, recognize the growing importance of the Galloway cattle-breeding industry in North America, and the advisability of concerted action for the purpose of furthering our interests ; therefore,

"Resolved—That there should be an association, comprising all breeders of Galloway cattle in North America, for the purpose of promoting the interests of the breed, and that the principal meetings of such an association should be at such time and place as shall be most convenient for the majority of the breeders ; that such association should arrange for the organization of branch societies in each State or Province where Galloway Cattle are bred ; that the majority of Galloway cattle now in America, are recorded in the Ontario Galloway Stock Register of Pure-bred Galloways it is a desirable to confer with the Agricultural and Arts Association of Ontario, as to whether they are willing to allow us to supervise all pedigrees hereafter published by them ; and that the book be called the North American Galloway Herd Book ; and that the President and officers, elected at the recent meeting in Kansas City, be requested to act in accordance with the suggestions made in these resolutions."

As I understand it, gentlemen, all that the breeders require is to see that no pedigrees are entered that are not of pure-bred cattle, and the breeders are to appoint one gentleman in each State or Province, to whom any doubtful pedigree be sent before being recorded ; they do not interfere in any other way ; we publishing our book and selling it. But they at their last meeting guaranteed to take some sixty odd volumes from us, as soon as we can get it published, which will, no doubt, be added to by the Kansas City organization by a great many more. A nice start for our Galloway Book, and as we have now, or will have at the end of the year, enough pedigrees to make a respectable volume, I would urge on the Council the necessity of authorizing me to publish the first volume at once, as there is quite a rage for these cattle in the West. I have tenders from two of the principal publishing firms in this city, which can be shown to your committee.

The title of the new book to be The North American Galloway Herd Book, compiled by the Secretary, and published by the Agricultural and Arts Association. Pedigrees to be supervised by a committee from the Galloway Breeders' Association.

At this point I would urge on our Council the necessity of publishing the first volume of the Ayrshire Herd Book, a small edition. I have the figures to show the committee as to the expense, and as I found, when in Montreal some time ago, I could not make any arrangements with the Quebec Herd Book, I have already commenced the work of correcting and preparing for the printer.

Now, gentlemen, I am afraid I have tired you out of all patience with Herd Books, and will attempt to give you a short description of the Chicago Fat Stock Show, in the Garden City of the West. In the first place, it was held in the large Exposition Building, in the heart of this wonderful city, where the latest buildings are eleven stories high, with lawyers' offices on the upper flat, you get into a steam hoist and go upwards until you think you will never stop ; but all at once you are there, and everything is just the same as on the first floor.

The Exposition Building [illegible]mense, one fifth of a mile long and two hundred and twenty-five feet in width, only one h[illegible] of it being required for this great show of fat cattle, consisting of two hundred and thirty-two head—one hundred and twenty-two of which were grade and pure bred Shorthorns, ninety of Herford and Polled Angus, the other elevens' breeding was not specified. There were two hundred sheep on exhibition, all fat, the Downs being well represented, plenty of long wools, and a few curiosities in the way of Merinos. Of pigs there were about one hundred of colours, from white to red, and all as fat and happy as swine could be in that wonderful city, where forty thousand a day is only a small arrival. There were also quite a quantity of poultry, both alive and dressed. I cannot begin to describe the qualities of the particular animals, more than to say the whole show was grand, and in the centre of the immense building was the prize ring filled with saw-dust, where the huge masses of beef were led out to delight the eyes of the crowd. The stalls were all fitted up in the building, and everything was as complete as possible. The management was excellent, everything brought down to figures, exact weight, age and breed of animal, with name and residence of the owner on a card in front of the animal. Our judge, Mr. G. F. Frankland, gave every satisfaction ; he was on fat sheep the first week, and on the sweepstakes for cattle the second. I was only sorry he did not get a chance to give an address to the breeders while there, as we all have heard his eloquence.

Our Canadian exhibitors did well. For pure-bred Shorthorns, three years and under four, our sweepstake friends, the Messrs. Groff, of Elmira, took the first prize. In same class for one year old and under two, Bow Park Association took first on really the handsomest animal I ever set eyes on ; they also took third prize on Shorthorn cow, three years old and over. On pure Herefords, Hon. M. H. Cochrane of Compton, Que., took first prize in class of three years old.

In Grades, our friends, the Groffs, only took third prize on Canadian Champion, a great injustice, as he was pronounced, again and again, the best animal of the three, but judges differ.

On dressed carcases, Mr. Cochrane's Hereford steer took the first prize, and it was wonderful to notice the difference between this carcase, fed in Canada on roots and grain, and the Western cattle, fed on grass and corn. The Canadian was a beautiful white and red, while the American ones were quite yellow; had any of the Canadian fed Shorthorns or Grades been slaughtered, we would have seen the same difference.

A prize was given on cost of production; entries accompanied by a verified statement, giving the exact age, breeding of the animal, the kind, quantity and quality of food consumed month by month, from the date of birth until the animal was exhibited. I am happy to say that our friends, the Groffs, took both first and second prizes, and their statement was highly complimented by Col. Mills, the Assistant-Secretary, and is to be published in their report. I am also publishing their statement of how they feed their cattle, given to us at Kingston, for the Prince of Wales' prize, in our report to the Commissioner, I believe, they also, as well as Bow Park, took prizes for early maturity.

In fat long wool sheep, Mrs. M. N. Hood, of Guelph, took three first prizes, as well as one third, and in Grade sheep, Mrs. Hood also took eleven prizes, and displayed a large card that Canada beats the world.

And now, gentlemen, with the fear that I am trespassing on your time, I cannot refrain from giving you a few statistics of the five Fat Cattle Shows held in Chicago, with the object of leaving to your consideration the advisability of you, gentlemen, starting something of the kind in Toronto. It has been thrown up to us that we could do nothing but run a show; suppose we undertake to run two shows. It might be held sometime in December before the Christmas market, and we could have our fall meeting at the same time, and encourage breeders to have sales in Toronto during the same week; have the meetings of the breeders and discussions on agricultural subjects during the evenings, and papers read on subjects of interest. I have no doubt the Toronto Electoral Division Agricultural Society would give us a helping hand, as they have nothing to do now but devote their energies to running a Horticultural Show in the summer, but at which our esteemed friend Dr. Smith, V.S., the President, looks rather out of place. They have lots of funds, and I have no doubt that they would be very willing to help our Association in every way in their power. To start in a small way at first a Fat Stock Show for Ontario; and to give you an idea of the expense of management, I will quote what it has cost the Illinois people for their show at Chicago the last five years. In 1878, the first show, the receipts from sale of tickets, entry fees and donations, were $4,624.06, the donations being large. The expenditures were, premiums paid, $2,395, cost of running show, $2,680.87, a total of $5,075.87, leaving a deficit to be made up from the State Board of Agriculture of $451.81

In 1879 the tickets and entry fees amounted to $4,680.08, donations $2,731, or $7,471.08 from all sources. The expenditures were, premiums paid, $4,221.73, other expenses, $5,110.59, a total of $9,332.32; deficit $1,861.24.

In 1880 the receipts from all sources (including donations) were $5,718.39. The expenses were, premiums, $2,450.76, other expenses, $4,045.76, total $6,496.38; deficit $578.18.

In 1881 the receipts from tickets and entries, were $2,967.75, subscriptions, $4,085, total $7,052.75. The premiums paid amounted to $3,323, running expenses, $3,747.78, total $7,070.78; deficit, $18.03

In 1882, I have not got the exact money receipts, but I know at the gates alone they took over $5,000, and I heard the Secretary say, that they would have more than enough to pay expenses. The show is becoming very popular with both the city people and the farmers and breeders. It is a question for our Council to consider, whether we can do any good in that direction. I am quite satisfied that if we do not step in, it will be started by some other body.

In conclusion, I must express my thanks to the President, Directors, and Secretary of the Illinois Board of Agriculture, for the many kindnesses shown me as a Delegate from the Agricultural and Arts Association.

All of which is respectfully submitted.

(Signed) HENRY WADE,
Secretary, Agricultural and Arts Association.

TORONTO, December, 1882.

ONTARIO VETERINARY COLLEGE.

To Henry Wade, Esq.,

Secretary Agricultural Arts Association :

Sir,—I have to report that the Session 1880–81 of the Ontario Veterinary College, opened on October 26th and closed at the end of March. It is satisfactory to be able to state that the attendance of students was larger than on any previous occasion, numbering about one hundred and thirty.

The following gentlemen graduated :—

Prize and Honor List (Seniors).

Pathology.—Silver medal, from Agricultural and Arts Association, T. Bent. Cotton ; second prize, W. A. Dryden ; third prize, J. T. Claris, J. H. Reed, T. Wrigglesworth, equal.

Honors.—Blanchard, Brodie, Hall, Hodgins, Lawson, McInally, Porteous, Smith, Thomas, Vandervoort, Walker, J. A. Waugh, Wessel, Yonkerman.

Anatomy.—Silver medal, from Agricultural and Arts Association, W. A. Dryden ; second prize, J. H. Reed ; third prize, Lyman Vandervoort.

Honors.—Brodie, Claris, T. B. Cotton, Lawson, Wrigglesworth, Walker, J. A. Waugh, Wessel, Yonkerman.

Entozoa.—Prize, D. P. Yonkerman.

Honors.—Claris, T. B. Cotton, Dryden, Lyons, J. H. Reed, Thomas, Vandervoort, Walker, W. J. Waugh.

Microscopy.—Prize, C. W. Stowe.

Honors.—Brodie, R. C. Clark, Cotton, S. G. Reed, Scanlan, W. J. Tanner, Thomas.

Physiology.—First prize, J. H. Reed ; second prize, D. P. Youkerman.

Honors.—Brodie, Clark, Dryden, Lawson, McLain, Price, S. G. Reed, W. Tanner, Vandervoort, Wessel, Wrigglesworth.

Chemistry.—First prize, J. H. Reed ; second prize, D. P. Yonkerman.

Honors.—Dryden, Vandervoort, Walker, Wessel, Waugh.

Anatomical Preparation.—Prize, W. Parkins.

Materia Medica.—First prize, J. H. Reed ; second prize, J. Brodie, W. A. Dryden, equal.

Honors.—Cotton, Vandervoort, Yonkerman.

Breeding and Management of Stock.—First prize, books valued at $20, awarded by Hon. S. C. Wood, Commissioner of Agriculture, J. H. Reed ; second prize, books $15, T. B. Cotton ; third prize, books $10, J. N. Cook. Second and third prizes awarded by Agricultural and Arts Association.

Honors.—Clark, Price, Wessel, J. A. Waugh.

Best General Examination.—Gold medal, J. H. Reed.

Honors.—Claris, Cotton, Dryden, Walker, J. A. Waugh, Yonkerman.

PRIZE AND HONOR LIST (JUNIORS).

Anatomy.—Silver medal, awarded by Agricultural and Arts Association, H. F. James ; second prize, C. C. McLain ; third prize, M. W. Sine.

Honors.—Denslow, V. L. James, Jopling, Jeffery, Newton, Stimpson, Sallade, A. Thomson.

Pathology.—First prize, F. James ; second prize, C. C. McLain, J. E. Blackall, H. B. Adair, M. W. Sine, equal.

Honors.—Dickenson, Dunn, Forbes, Howe, V. L. James, Jopling, Jeffery, Johnston, Parks, Plank, Sallade, Shaw, Smith, Stewart, A. Thompson, Stimpson, Whitney.

Chemistry.—First prize, S. Dickenson ; second prize, J. Newton.

Honors.—Carter, Denslow, Dunn.

Fall Examination, December 21st, 1881.

E. S. Bartram, Langsville, Mich.
J. A. Calder, Glanford, Ont.
A. Detlor, Belleville, Ont.
A. D. Mathews, Brougham, Ont.
W. Preston, Concord, Ont.
W. Sterling, New Hamburg, Ont,

Spring Examination, March 30th, 31st, 1882.

W. S. Bell, Kars, Ont.
L. D. Blanchard, Mount Eaton, Ohio.
H. G. Borneman, Clayton, Pa.
J. L. Brodie, New London, Iowa.
G. W. Burt, Lynnvalley, Ont.
J. T. Claris, Buffalo, N.Y.
B. C. Clark, Wellesley Village, Ont.
J. N. Cook, Glanford, Ont.
S. J. Cottam, Edinburgh, Scotland.
T. Bent. Cotton, Mount Vernon, Ohio.
W. A. Dryden, Tavistock, Ont.
F. Goulding, Richmond, Mich.
G. H. Hall, Chatham, Ont.
J. Hodgins, London, Ont.
J. D. Johnston, Wahoo, Nebraska.
J. Lawson, Acton, Ont.
W. G. Lyons, Cheltenham, Ont.
Alex. McDonald, Cobourg, Ont.
J. G. McInally, Lynnvalley, Ont.
W. McLain, Nanticoke, Ont.
W. Parkins, Beeton, Ont.
C. A. Pierce, Creston, Ill.
A. Porteous, Simcoe, Ont.
J. P. Rice, Line, Lexington, Pa.
J. Hugo Reed, Georgetown, Ont.
W. T. Scanlon, London, Ont.
C. L. Smith, Silver Cliff, Colorado.
H. H. Southerland, St. Francisville, Ill.
B. F. Swingley, Oregon, Ill.
A. Tanner, Drayton, Ont.
W. J. Tanner, Mount Forest, Ont.
T. A. Thomas, Paisley, Ont.
G. Vandervoort, Trenton, Ont.
A. A. Walker, Wingham, Ont.
J. A. Waugh, Pittsburg, Pa.
W. J. Waugh, Pittsburg, Pa.
A. E. Wessel, Waller, Ont.
J. Whytock, Teeswater, Ont.
T. Wrigglesworth, Georgetown, Ont.
D. P. Yonkerman, Cleveland, Ohio.

(Signed) ANDREW SMITH, V.S., *President.*

TORONTO, 1882.

REFERENCES.

1. Main Building.
2. Bursar's House.
3. Professor's House.
4. Ice House.
5. Porter's Lodge.
6. Main Entrance.
7. Back do.
8. Greenhouse, etc.
9. Laboratory.
10. Lecture-Room.
11. Chemical Laboratory.
12. Convocation Hall.
13. Sites for proposed buildings.
14. Cottage for Farmer.
15. do Gardener.
16. Farm Buildings.
17. Fountain.
18. Flower-beds.
19. Vases.
20. Play-ground and Lawn Tennis.
21. Kitchen Garden.
22. Hedge of Norway Fir.
23. do Arbor Vitæ.
24. Sub-tropical Beds.
25. Choice Evergreens.

AGRICULTURAL COLLEGE, GUELPH.

PLAN OF GROUNDS.

Scale, 200 ft. to 1 in.

MILLER & YATES,

Landscape Gardeners,

PHILADELPHIA, Pa.

REFERENCES TO ARBORETUM.

A. Anacardiaceæ	Sumach.	T. Malvaceæ	Mallow.
B. Aquifoliaceæ	Holly.	U. Myricaceæ	Sweet Gale.
C. Araliaceæ	Ginseng.	V. Oleaceæ	Olive.
D. Berberaceæ	Barberry.	W. Platanaceæ	Plane-tree.
E. Betulaceæ	Birch.	X. Rhamnaceæ	Buck-thorn.
F. Bignoniaceæ	Bignonia.	Y. Rosaceæ	Rose.
G. Calycanthaceæ	Calycanthus.	Z. Rubiaceæ	Madder.
H. Caprifoliaceæ	Honeysuckle.	AA. Rutaceæ	Rue.
I. Celastraceæ	Staff-tree.	BB. Salicaceæ	Willows and Poplars
J. Coniferæ	Pine.	CC. Sapindaceæ	Soapberry.
K. Cornaceæ	Dogwood.	DD. Saxifrageæ	Saxifrage.
L. Cupuliferæ	Oak.	EE. Styraceæ	Storax.
M. Ericaceæ	Heath.	FF. Tamaricaceæ	Tamarisk.
N. Euphorbiaceæ	Spurge.	GG. Tiliaceæ	Linden.
O. Hamamelaceæ	Witch Hazel.	HH. Urticaceæ	Nettle.
P. Juglandaceæ	Walnut.	II. Verbenaceæ	Verbena or Vervain.
Q. Lauraceæ	Laurel.		
R. Leguminaceæ	Pulse or Bean.		
S. Magnoliaceæ	Magnolia or Holly-hock Family.		

Anato
James ; se

Honor
Thomson.

Patho
H. B. Ada

Hono
Parks, Pla

Chem

Hono

E. S. Bart
J. A. Cald
A. Detlor,

W. S. Bel
L. D. Bla
H. G. Bo
J. L. Bro
G. W. Bu
J. T. Clar
B. C. Cla
J. N. Coc
S. J. Cott
T. Bent. (
W. A. Dr
F. Gouldi
G. H. He
J. Hodgi
J. D. Joh
J. Lawso
W. G. Ly
Alex. Mc
J. G. Mc
W. McLa

Toro

APPENDIX TO REPORT

OF THE

Commissioner of Agriculture and Arts.

APPENDIX (C).

ANNUAL REPORT OF THE FRUIT GROWERS' ASSOCIATION OF THE PROVINCE OF ONTARIO, FOR THE YEAR 1882.

APPENDIX TO REPORT

OF THE

Commissioner of Agriculture and Arts.

APPENDIX (C).

ANNUAL REPORT OF THE FRUIT GROWERS' ASSOCIATION OF THE PROVINCE OF ONTARIO, FOR THE YEAR 1882.

To the Honourable the Commissioner of Agriculture:

Dear Sir,—I have the honour to hand you the report of the Fruit Growers' Association of Ontario for the year 1882. The discussions have been carefully taken down by an able short-hand reporter, and will be found to contain an unusual amount of very valuable information on matters pertaining to the objects of this Association. The papers contributed by the members will be found to be full of practical information, the results often of extended experience.

The *Canadian Horticulturist* has been enlarged to twenty-four pages, and otherwise improved, so that it is becoming a most valuable periodical and highly appreciated by the public.

The membership of the Association has increased upwards of fifty per cent. during the past year. There is evidently a growing interest in the Association, and its usefulness is continually being extended.

Trusting that you will be pleased with the work performed by the Association during the past year,

I have the honour to be,

Your most obedient servant,

D. W. BEADLE, *Secretary.*

PROCEEDINGS AT THE ANNUAL MEETING.

The Annual Meeting of the Fruit Growers' Association of Ontario, held at Kingston, 19th September, 1882.

President Dempsey was in the chair.

The minutes of the last annual meeting were read and approved.

The Directors' Report was read and received.

The Treasurer's Report was read and received.

The President presented his annual address, and a vote of thanks was accorded to him for it.

The meeting then proceeded to the election of officers for the ensuing year.

Wm. Saunders Esq., London, was elected President, and Wm. Roy Esq., Owen Sound, Vice-President.

Mr. Drury moved a nominating committee of three, carried.

The President appointed Messrs. Rykert, Dunlop, and Denton, Nominating Committee.

The Nominating Committee retired and prepared their Report, which was presented to the meeting by Mr. Rykert.

The following gentlemen were then chosen Directors: No. 1, John Croil, Aultsville; No. 2, P. E. Bucke, Ottawa; No. 3, R. J. Dunlop, Kingston; No. 4, P. C. Dempsey, Trenton; No. 5, Thos. Beall, Lindsay; No. 6, Geo. Leslie, Jr., Leslie; No. 7, W. H. Mills, Hamilton, who has since declined to act; No. 8, A. M. Smith, St. Catharines; No. 9, C. Arnold, Paris; No. 10, A. McD. Allan, Goderich; No. 11, J. M. Denton, London; No. 12. B. Gott, Arkona; No. 13, C. Drury, Crown Hill.

The following gentlemen were chosen Auditors: John A. Bruce, Hamilton; Angus Sutherland, Hamilton. Meeting adjourned.

DIRECTORS' REPORT.

To the Members of the Fruit Growers' Association of Ontario:

GENTLEMEN,—It is with feelings of great pleasure that your Directors come before you at the close of their year's labour and present their report of the condition of the Association.

During the year the membership has increased fully fifty per cent., rising from eleven hundred and ninety-eight to eighteen hundred and thirty-nine.

The binding of our annual report is a great improvement, for which we are largely indebted to the deep interest which the Honourable S. C. Wood, Commissioner of Agriculture, is taking in all matters embraced within the operations of this Association, and who feels that the information contained in these reports, is worthy of careful preservation.

We have acted upon the suggestion of your Directors of last year and increased the size of the *Canadian Horticulturist*, to very nearly double the amount of reading matter, and added a coloured illustration to each number, thereby enhancing very materially, both the usefulness, and attractive appearance of our Monthly. We have abundant reason to believe that these changes have met with the cordial approval of our members, and that they have been important means of increasing our membership. It will be for our successors to consider whether further improvements may not be attempted, and particularly, whether the popularity and usefulness of our Magazine may not be still further secured.

The experiment of reporting the discussions of the Winter Meeting by a shorthand reporter, proved to be so successful in securing a full and accurate report of the valuable suggestions and experiences given at those meetings, that your Directors obtained the services of the same reporter at the Summer Meeting, so that the report for 1882, will be one of the most complete and valuable ever issued. The Midsummer Meeting held at the flourishing town of Trenton was a great success. The attendance was remarkably large at that season, and the interest manifested in the discussions was very spirited. The Corporation of Trenton entertained the members with a magnificent banquet, at which the interchange of thought and of kindly feeling was continued into the morning hours. Many members availed themselves of the liberality of the Central Ontario Railway, to make an excursion to Picton and the Sand-banks, and in this way examine the capacities of that famous fruit growing country.

The planting of fruit and forest trees at the Experimental Farm, Guelph, was not so extensive this year as last, but enough was done to maintain and somewhat extend the work. We are happy to be able to say that the plantations are in a thriving condition, and that with care in preserving what has been done, and making each year such additions as may be necessary to meet the requirements of horticultural progress, the institution will soon feel the benefits of this work.

The financial condition of the Association is very satisfactory. Notwithstanding the increased expenditure consequent upon the enlargement and illustration of the *Canadian Horticulturist*, and the reporting of the discussions, we have been able to meet the demands upon us, and the year will close with means sufficient to meet all our liabilities.

All of which is respectfully submitted.

TREASURER'S REPORT.

Receipts.	$ cts.	
Members' fees	1,839 00	
Government Grant	1,800 00	
Advertising	17 50	
	3,656 50	
Balance at last audit	751 83	
		$4,408 33

Disbursements.	$ cts.	
Postage and Telegrams	74 22	
Freight and express	13 20	
Duties	39 80	
Printing, binding and mailing	906 55	
Directors' and Committees' Expenses	588 78	
Audit, 1881	20 00	
Guarantee premium	20 00	
Rooms, meetings	4 00	
Stationery	13 40	
Advertising	20 00	
Clerk	100 00	
Reporting winter meeting	55 00	
Plant distribution	497 28	
Illustrations	331 50	
Commissions collecting fees	66 15	
Secretary	200 00	
Editor	400 00	
Balance in treasury	1,058 45	
		$4,408 33

Liabilities.	$ cts.
Printing, binding and mailing	500 00
Illustrations	225 00
Directors and committees	200 00
Audit, 1882	20 00
Reporting summer meeting	35 00
Postages, express and duties	45 00
	$1,025 00

We certify the above to be a correct abstract.

JOHN A. BRUCE,
ANGUS SUTHERLAND, } *Auditors.*

PRESIDENT'S ANNUAL ADDRESS.

Members of the Fruit Growers' Association:

Gentlemen,—Another year has past and it becomes my duty to address you upon the important subject of horticulture. The season has not been favourable for the fruit grower. Over the greater part of our Province, the past winter was very severe. In many places there was no snow to protect the roots of trees or plants from the effects of the severe frost. In such sections strawberries suffered, some beds being frozen so they were past any possibility of recovery. With my own, the rains that came in April and May partly restored their vigour, so that they were induced to set an abundance of fruit. The drouth that immediately followed, caused the greater part of the crop to perish. Where frequent showers continued through the season the crop was good. The raspberries were destroyed, in many localities, by a cutting frost, when in blossom. Some places where they were more favourably situated, they escaped, consequently there was a full average crop harvested. The markets having ranged high have partially compensated for the failure.

APPLES AND PEARS.

Never in the history of your Association was there a better prospect of an abundant crop. The bloom was simply immense, but about the first of June the foliage and embryo fruit was attacked by a fungus or mildew, that utterly destroyed the prospect, that a few days previous was so bright. In some sections, where fruit has set partially, a large per centage of samples are spotted and one-sided. Plums, peaches and cherries have suffered in like manner. But I think in my own section of the country, the result may be attributed to the frost, that the roots of those trees were so near the surface, that in the absence of snow to protect them from the severity of the winter, many of them have succumbed to the effect. I have a row of early Richmond cherries that is grown in ground that freezes deep, and more than one half of them are dead. Some of my neighbours can testify to similar results with plums. Even apple trees have been affected in the same way. After listening to some remarks made by my friend, H. F. Young, Esq., of Trenton, at our summer meeting, I was induced to visit his grounds. There is a ridge or rise of ground extending across his orchard, where no doubt what little snow fell was blown off into the flats. On this ridge there are several trees of the most hardy varities frozen dead. It is only right to say here, that Mr. Young manured heavily with stable manure, and cultivated late last season; a practice that nearly always proves disastrous to an orchard and should never be done.

Grapes, in the more northern sections of our Province, when protected by being laid down for the winter, and covered with a slight covering, are giving a good crop of very fine fruit. In some places vines have been known to fail after starting into growth. The leaves turned yellow and presented a sickly appearance. A popular opinion was, that the frost had destroyed the roots. But an investigation was made by Messrs. Saunders and Denton, of London. Upon examining the roots of the vines, they found the effects of the Phylloxera, and the insects themselves in large quantities. I hope this insect pest will not prove so formidable an enemy to our vineyardists as it has in Europe. There the vineyardists, or at least many of them, have been obliged to abandon the enterprise, not being able to find any antidote or means for the destruction of the enemy.

IS THERE ANY POSSIBILITY OF OVERSTOCKING OUR MARKETS WITH FRUITS?

In the year of 1874 there was an abundant crop of fruit, of every description. Some growers did not know what to do with the surplus crop. Evaporators were not plentiful at that time; canning was poorly understood; vinegar and jelly establishments

were few and far between. The export to Europe was not introduced or practised to any great extent. The question was raised by not a few, will it pay to increase our orchards? The people were looking for an equal crop to follow the next year, but in vain, for a similar result was not experienced for six years. In 1880 a similar productive year returned. People having learned by past experience, were induced to erect large evaporating, jelly and canning establishments for the purpose of saving the surplus as much as possible. Where, I ask you, is that surplus to-day? Considerable competition has been observed between buyers of fruit this season. Some for export, but more for manufacturing. An estimate has been made after a thorough trial, and the result was, that a barrel of Northern Spy apples when canned was worth $8.00. Parings and cores when dried sold for five cents per pound, for the purpose of making jelly, and thus they paid largely towards the expenses of manufacturing. In as much then, as a universal crop does not occur more than once in five years, and the fruit growers are being educated to their business, is there any danger of a glut in the markets like those of 1874 and 1880 ever being repeated?

How are the fruit growers being educated? You are scattering every year through your report an amount of information that cannot be obtained in any other way, so reliable. Many able papers are being prepared by skilful hands, setting forth the result of practical experience and scientific truth that are being read at your meetings which are held in different sections of this fair Ontario of ours.

Again, the *Canadian Horticulturist*, published by you is ever full of reliable and useful information, the result of years of experience, gained through research, experiment and practice.

Allow me to congratulate you, that there is the disposition and ability in our membership to send out so much useful information upon such an important branch of industry, and a readiness on the part of our Government to provide the means for its dissemination. The results of your labours are being seen in the abundance of fine fruits now on exhibition at every fair and for sale in our markets, and those labours will be appreciated, I hope, by generations that are to follow you.

NEW FRUITS.

A good deal has been done within the last twenty years to produce new fruits. Wm. Saunders, Esq., of London, has surprised the world by his hybrid gooseberries, currants, raspberries and grapes. Charles Arnold, Esq., of Paris, has accomplished wonders in his new American Wonder pea and several other vegetables, besides strawberries, raspberries, grapes and apples. His Ontario apple bids fair to become one of our best market varieties. Messrs. Haskins and Mills, of Hamilton, have produced some very fine hybrid grapes, some of which I think must eventually create an excitement among the fruit growers of America.

There are many others that are engaged in this, one of the most pleasing of enterprises—I mean the producing of new fruits, vegetables and flowers by artificially crossing in the blossoms—whose names should be mentioned if it would not become wearisome to you. I wish that more of our young men would commence experimenting in this field. I cannot recommend too strongly an effort yet to improve the apple. Not but that we have varieties that are very good, and those that are vigorous, productive and hardy; those that possess good shipping, desert, and cooking qualities. But while the Baldwin possesses nearly all the good points for shipping, the tree is not sufficiently hardy in all sections of our Province. The Northern Spy seems to possess all the characteristics of a good fruit, but it is a long time coming into bearing, and when it does, the tree becomes tender and is liable to fail in a very few years. What we want is an apple that has as many of the desirable points as possible. At the present time the trees are propagated by grafting or budding the best varieties we have. Formerly nearly every family had a little nursery of seedling trees that has given to the world the immense collection of varieties we now have. Why can we not each plant a small orchard with seedlings from seeds saved from our best varieties, for by this means we may obtain some that will be superior to

anything that we now have in cultivation, and should they prove inferior, it is an easy matter to top graft them with such varieties as we may prefer. Let us try to get an apple that is as hardy, thrifty and productive as the Talman Sweet, and as good for shipping as the Baldwin, and with flavour as good as Coxes' Orange Pippin, and that will keep equal to the Ben Davis.

The person that will produce an apple that will possess all of these points, may be called a benefactor, and it may be said of him, "he has lived a life of usefulness, and his name will remain on the page of history."

ADVANTAGES OF CROSS FERTILIZATION OR HYBRIDIZATION.

What wonders have been achieved in the vegetable kingdom by cross fertilization within our own memory. But are there not greater results to be achieved by this art as time advances producing new and improved varieties of much superior excellence? Instances are so numerous of wonderful results being achieved by the application of this art in the production of new vegetables, flowers and fruits, in Europe and the United States, as well as in Ontario, that it becomes our duty to encourage those who may feel disposed to commence such an enterprise of so vast importance to the future of our fair Province. Who, I ask you, that has seen the results of this art in Arnold's wheat, peas, corn, raspberries, strawberries, grapes and apples; A. M. Smith's raspberries and strawberries; Saunders' raspberries, gooseberries, grapes and many wild flowers crossed with cultivated species; Haskins', Mills' and others' grapes, and pears, the many improvements throughout the world in the vegetable kingdom generally, can hesitate to say, that this is the art, is the great secret and source of the wonderful success that has been achieved during the last thirty or forty years? The Hon. Marshall P. Wilder says, that this improvement is all within the hand of man, to use it as he will, and that the field of progress is endless. It is your duty, gentlemen, to occupy the ground. The same Divine Power that gave us the almost infinite variety of plants and trees, also furnished them with the ability—not only to perpetuate themselves, but under judicious treatment, and a wise selection of parents, to produce indefinitely still better varieties than we now possess. In a word, we must depend mainly on the production from seed of fruits adapted to the various portions of our vast territory. And what richer legacy can a man leave to the generations that are to follow him than a fine delicious fruit, which he shall have originated by his own hand. This will be a living monument to his memory when posterity shall recline beneath the shade of its branches and pluck the precious fruit from the trees which he has left them.

PROGRESS OF YOUR ASSOCIATION.

Twenty or more years past, your Association was organized in the City of Hamilton. It was then called the Fruit Growers' Association of Upper Canada. I think the Hon. Judge Logie was the first President. Among the officers of that day we find very few surviving at the present time. There are, however, some among us yet. Charles Arnold, Esq., of Paris, who still holds a position among you, was then the second Vice-President. We find he has always done what he could to foster the interest of your Association. D. W. Beadle, Esq., of St. Catharines, was the first Secretary, and after looking over the history of your Association with care, I am only able to say, that the present Secretary has been the best that we have ever had; in fact, gentlemen, he is the Alpha and Omega thus far. While looking over your reports for the last score of years, I, as one of you, feel like congratulating him, for not only the amount of zeal which he has manifested, but for his untiring labours, serving this Association in the same position for so many years. We have several among us that have manifested an untiring zeal for the improvement of fruits, vegetables and flowers, that have very kindly given their time for the advancement of your Association. As the result of these labours, you have an increase of membership this year over the last of about seven hundred, a number that is not to be despised, when we learn that many kindred Associations upon this continent do not number more than one-third the amount.

How can we make our Association more useful? Our winter meetings are generally well attended, and it seems to me that every one that attends them is amply paid for the time and labour spent. We enjoy a privilege that can scarcely be attained in any other way, the privilege of grasping a brother's hand and exchanging ideas; privileges that seem too difficult to secure in any other way. Our Summer Meetings are not so well attended, coming as they usually do on account of the maturing of small fruits, just as the farmers are commencing to harvest. Can we not hold thirteen summer meetings—say one in each Electoral division, each meeting to be presided over by the director representing that division. It occurs to me that in this way we may induce many to attend and take part in our discussions that we don't have the pleasure of seeing or hearing anything from. Again, the information obtained would be sectional and consequently more valuable. The expenses of these meetings would not be so much as now, even if we had to employ a Secretary for each of them. The Agricultural and Horticultural Societies could in many instances be induced to unite with us. Nearly every farmer, merchant, mechanic, teacher, or gardener, is becoming interested in this, one of the most interesting branches of industry. Many questions are being asked every day: How can I best ornament my grounds? How can I grow raspberries and strawberries to supply my family? How do you manage to get such fine melons, cauliflowers, celery, and other vegetables? Thus we find the majority of our population becoming interested in this most important branch of husbandry.

Again, can we not in some way induce ladies to attend our meetings, by arranging our subjects so that they would become interested in them? Could we not admit man and wife as members upon the payment of one dollar and fifty cents, only sending them one copy of the Report and the *Horticulturist*? By this means the man could select his tree and vine, while his wife could choose her flower or vegetable, as the case may be. Can we not induce ladies to contribute papers to be read at these meetings upon their favourite flower, or their best varieties of vegetables or fruit for canning or culinary purposes?

FORESTRY.

More than that of other workmen, the farmer's business binds him at home. He lives on or near the soil he tills. Hence, above all others, he should try to make his home attractive and pleasant by planting ornamental trees and shrubs about his place. Can we not encourage a taste for arboriculture by introducing the study of Botany in our common schools? Could not our teachers make the study interesting by showing the children how plants grow, what are the component parts of a tree, the difference between the formation of wood and bark, and how to recognise the different species by their foliage and otherwise? Also by encouraging them to plant each a tree within the school grounds, each to watch and care for his own tree or plant. Could this system not be so introduced among our people, that the love and respect for tree culture will become so inculcated in the minds of the people that they will look upon any person that will deface or destroy any ornamental or shade tree, as upon one that would rob them of their own existence or best friend? Would it not have a tendency to some extent to do away with those bush fires that are so much dreaded? Could not our children so be taught that the next generation would hold our forest as sacred, and preserve them as one of God's blessings to them, particularly those forests situate upon lands that will not admit of cultivation? Cannot our farmers be taught, that, when clearing their lands, it will pay them to preserve all the surface soil and decaying foliage as one of their greatest treasures?

Gentlemen, I must not detain you any longer. These suggestions are made for your consideration. I know not whether you will find them of any practical value. The field opening before us seems to be boundless; to be one that will task the utmost power of human thought and energy. I wish you God speed in your every undertaking to further the objects of our noble society.

THE WINTER MEETING

was held in the City Hall, Hamilton, on Wednesday and Thursday, the 18th and 19th of January, 1882.

President Dempsey called the meeting to order.

The minutes of the last winter meeting and also those of the last summer meeting were read and approved.

The subjects proposed for discussion were then taken up.

GRAPES.

WHAT VARIETIES OF GRAPES ARE THE MOST PROFITABLE FOR MARKET?

Mr. Saunders was asked to introduce the discussion on this subject, and said: It is rather taking me by surprise to call upon me to give my views on grape growing for profit. I do not do anything of that sort. My grapes are all grown as the work of an amateur, and I do not know that I could give the meeting any information that would be of any value to them as to the varieties most profitable for market, other than as regards those that I know coming into market which have been grown by other people. The grapes that we find most abundant in the London market are the Concord, the Delaware, and some of Rogers' hybrids, particularly Nos. 15 and 4. I do not know that any of those grapes of later introduction—the more fancy varieties—are grown in our section for profit.

Mr. Beadle.—In the section of country where I live—the County of Lincoln—I suppose that as far as the experience of cultivators has gone, the Concord would be voted by our grape growers as on the whole the most profitable variety that they have as yet grown to any extent. They have found it to be very hardy and prolific, and to resist disease well; rarely suffering in fact from disease of any kind. They also find that it resists the attacks of insects, on account of its peculiarly woolly, thick leaf. It is true that grapes have been produced so abundantly of that variety that the price has gone down to an average, I should suppose, of about four or five cents a pound. Yet those who have raised that variety of grape say that even that rate pays them better than what they can get for any other crop, either of fruit or grain that they can get off the same acreage. Another variety of grape that is coming into favour with our planters is the Wilder—one of Rogers' varieties—a black grape of good size, and usually of a pretty good bunch. I believe that the average size of the bunches of that variety is better than that of several of the other Rogers' varieties. You are aware that the Rogers' varieties are apt to be very variable in the size of their bunches. I believe that that variety, on account of the grape being showy and the berries large, sells for about ten cents a pound wholesale. I am told that there is a gentleman living near Hamilton who has been growing it for market, that he had several tons of it last year, and that he wholesaled it at ten cents a pound—all his crop. Samuel Burner is the name of the gentleman I refer to. One of my neighbours living on the lake shore, Mr. William Reid, tells me that he finds that variety of grape a very promising one. He has been planting it and extending its planting, because of its having succeeded so well with him. He has also grown the Champion, *alias* Tallman, *alias* Beaconsfield; but he says that as soon as they can get a better grape people will not buy it. For a time it was a profitable grape, because it ripened so early that he got it into market before other grapes came in; but other grapes are coming into the market now, and consequently the time within which he can sell the Champion grape is so short that he does not market all his crop. It is a poor grape in quality, and he says that he will not plant any more of it for market. The Delaware grape is also grown in our section of the country for market. The small size of berry and bunch of that variety has been against it; but grape eaters have now learned its good qualities, and it will sell for a higher price in our market than the Concord. When the Concord is selling at four or

five cents it is bringing seven or eight, or possibly nine, and sometimes ten—say from seven to ten. I am inclined to believe, however, that the care it requires, good soil, good cultivation, and the taking away of superfluous bunches, it is prone to overcrop, makes it a little more expensive to raise than the Concord; and I doubt whether the increased price more than compensates for the increased care which it requires. On account of its growth in popular esteem in our section of the country, the demand for it is rather above the supply, and I think the demand for it is increasing. Unless some other variety of grape coming in about that part of the season, equaling it in quality and larger in size shall take its place, it is likely to be in demand for some time. Those are the varieties of grapes that are grown for market purposes in our locality to any extent. There are other varieties brought into the market, but it is only because there happen to be more in somebody's hands than are wanted for home consumption. I know of vineyards that are planted for wine making where they have other varieties, largely the Clinton, I am told; but for market purposes these are the varieties that are most planted with us; and I believe that everyone who has planted these varieties of grapes and has grown them has been satisfied with the pecuniary returns, even at what seems to be a low price for the fruit; that the amount of fruit that can be obtained from an acre is so large, and vines come into bearing so soon after being planted that grapes are thought to be profitable for the fruit grower.

Mr. Gott.—I claim to know very little about grape growing for market, although I do market considerable. The Secretary has named several of the best varieties. In addition to them we find some others profitable. The Hartford Prolific, for instance, we find to be very profitable in its season. It comes in immediately after the Champion, and before the Concord, and is a good flavoured grape, and takes well. Rogers' No. 9, usually known as Lindley, is a very valuable variety; his No. 19 is also good, and his Nos. 43 and 44 are equally good with No. 4. The vines are very hardy. Ive's Seedling is a most profitable grape, inasmuch as it is a most enormous bearer. The Iona in reference to flavour is, in my opinion, at the head of the list. It continues well in the market, and will command a good price. In some sections it is charged with tenderness, but the wood is very robust with us. When you say profitable for the market I scarcely know what to understand, because no two markets are the same. The tastes of markets differ, the same as the tastes of people differ. Some markets will require one kind of grape, and other markets will take hold of any kind of grape. We do not claim our markets up west to be first class, but the people there have tastes that we respect, and they will take hold of the Concord at the ordinary figure before they will take hold of the Delaware or Iona. The Iona and Delaware will not command extra prices in those markets on account of their extra qualities, but the Concord is everywhere acceptable.

Mr. Bucke.—I would like to know something about the profits of grapes, and about how much can be raised on an acre.

Mr. Biggar.—I agree with Dr. Beadle in regard to the Concord. I find that it is growing in favour more than it was, and an acquaintance of mine who sends grapes to the New York market says that there it is growing in favour. The quality of the grape depends a great deal on its cultivation. With good cultivation the grapes are much superior in quality. When I commenced attending the market here there were very few grapes brought in. If there came in 25 or 30 baskets extra, the market would go down on account of the quantity. The Concords were then ten cents to a shilling a pound, and the Delawares were a little higher. Since then the Delawares seem to have increased in value, from the fact that they have grown somewhat out of cultivation—the supply is not equal to the demand. I have grown four tons to the acre of Delawares and Concords—probably one ton of Delawares and three of Concords. At the time that I refer to they were sold principally in the Hamilton market. Some few were shipped to out markets—Guelph, Galt, London, etc. The profits were very satisfactory, but as grape planting became more extensive the prices declined, and we are now very glad to get three cents a pound for them at the station—three cents a pound for Concords and four and five cents for Delawares. The Concord, I have no doubt, is the grape for the people, its hardiness and productiveness, together with the quality make it so. I have fruited a number of Rogers', but cannot say that they have ever given me satisfaction. I have

fruited the Wilder, but have never found it to bear satisfactorily. The bunches were small, very showy, but not numerous. Those grapes have suffered from frosts. About eight years ago the thermometer went down 20 degrees below zero, and they were so injured by the frost that I never replanted them—I pulled them out. The price was a little high, but not high enough to compensate for the loss in the quantity. The Delaware requires a great deal of attention, and I think a man should have ten cents a pound for it, and five cents for the Concord, if he takes into consideration the difference in the cost of raising them. You cannot grow the quantity nor get the quality without a degree of attention that very few are willing to give to grapes. In regard to the Delaware, we have all been too ambitious to get quantity rather than to get quality, and our grapes have not ripened well. If we would have the courage to go through our vineyards and cut off about one-third of the Delaware grapes, and give them other attention—some pruning, some pinching back—we would have better Delawares, and command higher prices. Another grape that takes well in the market, an old known grape, one of our first grapes, the Isabella. I think it has been very much neglected. I find that it pays me well, in fact equal to any grape that I have. I find that every four or five years we lose a portion of the vines by the frost; but we can afford the loss. Last winter, a year ago, my vines were pretty nearly destroyed, but they are coming on again, and next year I shall have a good crop. There is no doubt that that grape will bear if properly taken care of, and I think its quality is much superior to that of the Concord. I shipped a couple of baskets to Glasgow, Scotland, a couple of years ago, and they went in very good condition. I should like to see the Isabella more extensively planted than it is. The Creveling is a grape that I am very much in love with. It is a good bearer, though the bunches are scraggy; but the quality of it is superior to that of any dark grape that I have ever grown, and the hardiness of the wood is all that you can desire. I would like to see the Hartford Prolific thrown out by the Society altogether, it is not fit for any decent Society to have. People must have a queer taste if they like it. The quality of the Iona is very fine, but it does not seem to ripen very well with me. I am on the lake shore. For wine making the Clinton, I think, stands ahead of any dark grape that I know of.

Mr. Dempsey.—There are a great many questions we should take into consideration in connection with that of growing grapes for market. The particular market to which we are sending our fruit is one thing that is very important to take into account. One market will require a certain quality of grapes, while another market will submit to almost anything. I find in marketing grapes that colour is a very important matter. Parties wishing to decorate their tables with fruits like to have a red grape, and a white grape, and a black grape, mixed on the table at the same time. Another question that we should not lose sight of is with regard to the season of maturity. I find that some varieties that ripen very early command a high price in the market, but a little later, when everything comes into the market, we must have a very fine grape in order to get anything like a remunerative price. Then we require a grape that will stand well—that will ship and keep. This year the grapes that were in first with us were the Champion and the Worden. They were sent into the market, and my little son, who was in charge of them, said, "Pa, I have one request to make of you, and that is that you will never send me to market with another Champion grape." I have thought that over, and if I can have any success in grafting, I will never have another Champion in the market again. But the Worden is in the market two weeks before the Concord. I do not know that it would produce so many tons to the acre perhaps as the Concord, from the fact that it is not so rapid a grower; but I defy any man to go into a vinery and select the Concord from the Worden from the appearance of the vine, either the foliage or the stock—they look alike exactly. I could not do it, at all events. I think that the Worden is one of the most profitable black grapes that we have. Moore's Early may be just as profitable—perhaps more profitable. On our grounds, a few days after our Delawares have set, we take the precaution to thin the bunches; we just walk along with a pair of scissors, and cut off about two-thirds of the bunches, and I find that this not only increases the size of the bunches that are left, but also causes them to mature earlier than the Concords. Nearly all varieties of grapes are benefited by thinning, and very little decreased in weight; but any decrease that there is in this way is more than compensated for by the increased

weight of the bunch. When we come to the later grapes, I find nothing that pleases me so well as Rogers' 44. It is a grape which you may cut, tumble into a basket if you like, send to market, and every berry of it will come out sound after being cut a fortnight. It will produce as many pounds of fruit as any of Rogers' hybrids. My wife on Sunday evening brought me some bunches of Rogers' 44 that had just been thrown in a pile inside of a store room, and subjected to light frosts, and they were really very fine fruit. I think that of all Rogers' black grapes I would place Rogers' 44 at the head of the list. It is a little later than 9 or 4.

A Member.—Is it better than 43?

Mr. Dempsey.—Yes, with me. I find, however, that these grapes, like other fruits, differ in different sections of the country. In some sections we find Rogers' 15 superior to any other of Rogers'. In fact, I plant it extensively on account of it being a red grape. This year we sent Rogers' 15, Rogers' 44, and one of my own hybrids, a white grape, to the market, and it commanded a high price, and was sought for by nearly every person, and they came a second time and a third time, and we did not lose any customers by it.

Mr. Beadle.—How many tons of Concords do you get to the acre in your part of the world?

Mr. Dempsey.—I cannot answer that question fully, because I have not given the subject that strict attention.

Mr. Biggar.—I have grown four tons to the acre.

A Member.—What do you think of Rogers' 16.

Mr. Dempsey.—It is rather a fine grape. Rogers' 34 and Rogers' 5 are also very fine grapes; but those happen to be three varieties that we have rooted out altogether, on account of mildew, it takes perfect possession of them, and I have abandoned the idea of trying to cultivate them any more. I should include the Salem among them. The Salem mildews with me.

Mr. Gott.—You have not mentioned any white grape, I think.

A Member.—He is delicate about his own.

Mr. Gott.—We find Martha a profitable white grape. It takes well in the market. It is a heavy bearer. We used to have a good opinion of Rebecca, but last winter killed it down. The root is living yet. Rogers' 15 with us is a failure. The fruit is good, but it mildews so badly we cannot grow it. As to amount, we might give you a little of our experience. Our plantation consists of 250 vines, and their net product was 5,000 pounds. That is, for the season last past. The average product per vine was 20 pounds, and the value was $1.60 per vine. At the same rate of planting, an acre of ground would contain 544 vines, and the produce would be 10,880, or five and a-half tons, which would sell, at the rate that we sold ours at this season, for $870. This we find by looking over the Commissioner's Report from Washington is in excess of the highest given rate for the State of Michigan. In that State the highest given rate, according to the Commissioner's Report, was 10,000 pounds, and that was in the County of Kent. The average for the State was 4,523 pounds.

Mr. Arnold.—I endorse what Mr. Biggar says about the Hartford Prolific grape. With us—when we get it, we have not got it—it is all on the ground. It does not stick to the bunch. Take it to the market and it is all in the basket instead of on the stems. And it is a very foxy grape. The Iona does not succeed in our section of the country—it is too tender. There are very few parts of the country that it will succeed in. I think north of the Grand Trunk Railway it will not succeed. The Delaware is a very fine grape. It is a gross feeder, and if it is well fed it will succeed. The Creveling is a splendid grape if it is well fertilized. It is so imperfect in its fructification that it should stand near some other grapes that have abundance of spare pollen. Otherwise you will find but three or four berries on the bunch. One favourite of mine is Rogers' No. 3. It is the earliest grape I grow, and I can get a double price for it. It is an early red grape, and has a good bunch. With me it is far more profitable than the Concord.

Mr. A. M. Smith.—How is it for bearing?

Mr. Arnold.—The first vine that I got seemed to be failing. I took a number of layers from it, planted them in differents parts of the ground, and they bore an immense

crop, equal if not superior to anything I have. It wants to be put in the open ground. I had it alongside a building at first, and it did not seem to like that. It is quite as early as the Hartford Prolific.

Mr. Gott.—It is not always the most valuable grape that sells best. The Hartford Prolific is profitable in the amount of grapes that it produces, and in the supplying of the demand. We do not claim for them, however, first class quality. Their falling off the bunch is the fault of the grower—not their own fault absolutely. Rogers' No. 15, Agawam, is not a success with us, although a very fine grape. All grape vines must be fed to some extent, and it makes very little difference what they are fed on so long as it is something good and substantial. I suppose the food mine gets is of that character.

Mr. Dempsey.—The varieties of Rogers' hybrids that do best with us are 3, 4, 9, 15, 19, 43 and 44.

Mr. Beall.—When you were speaking of the kinds of grapes you sent to market, you did not mention the name of the white. Will you be good enough to tell us which one it was?

Mr. Dempsey.—It was my No. 25. It requires some degree of care to cultivate it; it is liable to mildew. I thought at one time that I would try and make some money out of it by having it propagated, but I have not done that from the fact that the foliage seemed tender. It is a rapid grower. The vine is easily propagated. It is enormously fruitful, and requires to be thinned in the bunch and in the branches. It has made more money for me this year than any other two varieties.

Mr. Bucke.—We grow Mr. Dempsey's No. 60. He was kind enough to send me a vine a few years ago, and I have found it a very rapid grower, and a very good bearer. I have only had a very few berries from it that were ripe, however. It is of course very necessary to get an area of country in which a new grape will grow. I think this No. 60 is a grape that ought to be tried over various parts of the country. Some grapes mildew with Mr. Gott that grow perfectly well with me, and some grapes mildew with me that grow well with him.

Mr. Gott.—Another grape that should have been mentioned, inasmuch as the Society had something to do with its dissemination, is the Eumelan. With us it is a failure, inasmuch as it mildews very badly both in leaf and in berry.

Mr. Carpenter.—I may be styled the largest grower in this section of the country at the present time. Still I have been but very few years in it. I grow different varieties from most other persons about me. I have quite a number of Rogers' varieties, and for profit I would select of Rogers' varieties, the 4, 9, and 15, as far as I have cultivated it, although the 15 is not as valuable as the other two varieties. Last winter, a year ago, about half of my Rogers' varieties perished with the frost, so that I do not feel quite as enthusiastic on the Rogers' grapes as I did a year or two ago. I would consider the Concord, the Delaware, and the Rogers' 4 as among the leading varieties. We require more of the pink grapes to supply some of our markets. Our customers in the west as well as in the north require pink grapes as well as black ones. Some in London when sending for grapes will ask for Rogers' 9 and 15 and the Concord. In Sarnia they wish for some of the pink grapes as well. I have not fruited any of Rogers' 43 and 44 as yet. I have quite a number out. My Rogers' vines, particularly Rogers' 4, a year ago last summer, produced about 40 pounds to the vine, about two-thirds of them. The overbearing might have had a little to do with the winter killing. The greater portion of my Concords have this year borne about 30 pounds to the vine. My vines of that variety are five years old. I have the Rogers' 3, and I do not think much of it. The bunches are very inferior with me. It is an early grape, and it will hang on the vines until the end of the season. It ripened up a year ago. Last year it did not. It never ripened but once.

A Member.—What did you think of it when you saw it ripe?

Mr. Carpenter.—Very good. The Iona with me did very well last year. That was the first year that I had any success in ripening it. It bore heavily. I believe Mr. Gott's vines are a little closer together than mine. Mine are twelve feet apart in the row. The Hartford Prolific I am not very much in favour of. Last year I picked once off them, and the remainder of them seemed to dry on the vines and to fall off.

Mr. Orr.—Mr. President, in speaking of the Delaware you say that you pruned off about half or two-thirds of the bunches. I would like to ask you if you pruned early in the spring, and how much each of the vines would yield you on an average?

Mr. Dempsey.—Our Delaware vines will only yield us about one-third of what the Concord vine will; but we grow two Delaware vines where we grow one Concord vine, and what the single vine yields us I would not be able to say, because I have kept no track of it whatever. I fancy that the Delaware would not come so far behind the Concord per acre as some imagine. It would not in our section of the country. There is a grape which has not been spoken about this morning that I would have liked to have heard something about, that is the Brighton. It is fruiting very well with us. It is a good grape, but it will not stand very long after ripening—it loses its flavour.

Mr. Biggar.—Is it a good grower?

Mr. Dempsey.—It is a good grower with us, and very prolific.

Mr. Biggar.—I cannot get it to grow.

Mr. Carpenter.—That is my trouble too.

Mr. Dempsey.—Wherever I have seen it in our section of the country it appears to be doing well. I have heard some men say that it was the best grape on their premises. Dr. Day, for example, cultivates a great many different varieties, only one or two plants of each kind, and I heard him say that the Brighton was standing at the top of the list, except my 25; and of course my 25 I do not recommend to anyone for the reason I explained. The Brighton grape requires pretty high culture. It requires considerable manure.

WHAT SORTS OF GRAPES ARE MOST DESIRABLE FOR AMATEUR CULTIVATION?

The discussion of this subject was next taken up.

Mr. Biggar.—In some places one variety would do which would not in another. I can ripen the Diana very well. With you I suppose it would not ripen at all. Have you ever fruited it, Mr. President?

Mr. Dempsey.—Yes, I have fruited it. It does not ripen, or rather it ripens in pieces. We will have a few grapes of it that will ripen and be very nice, but two-thirds of the bunch will never ripen at all.

Mr. Biggar.—Occasionally with me one part of the bunch will be ripe while the other is green still. Those grapes will sell green in the Hamilton market better than some dark grapes.

Mr. Saunders.—I grow a good many kinds of grapes. The Diana is not a success with us. I do not think that in our district it would be worth cultivating. It ripens very irregularly; and for my part I do not like the flavour of it. I do not think the public generally are favourable to a grape with so much of the fox character in it, and with so tough a skin. So far as my own taste goes, I would put the Burnet at the head of the list for eating and for amateur cultivation. Next to that for eating I would place the Canada, and next to that the Creveling. Then there are some of Rogers' varieties that in my estimation would come in, and after them the Delaware and the Concord. The differences of taste in different individuals would of course result in great difference of opinion in matters of this kind; but for my own taste, and I find a great many people whose tastes run in the same direction, the grape that is not too dead sweet suits better than a grape that has that heavy saccharine character that some of Rogers' hybrids have.

At this stage of the proceedings, Mr. Woodward, of Lockport, N.Y., and Mr. S. D. Willard, of Geneva, N.Y., entered the hall, and were cordially welcomed by the meeting.

Mr. Saunders—resuming his remarks.—The Martha is another grape that succeeds very well with us. There are many people who like to see grapes of two or three colours on their table at the same time. You will find that the colour that is the scarcest in the market will command the highest price. The Delaware is a grape that with us commands a higher price than the Concord, and is a much pleasanter grape, to my mind, to eat, but the skin is a little tough, and when chewed is a little acrid. That quality of skin prevails very largely in the Rogers' hybrid varieties, and prevents you chewing the skin with any degree of pleasure. The skin of the Burnet and Canada can be chewed

for any length of time without producing any unpleasantness. I think that is a point that ought to be considered in grape culture. The Iona will not ripen with us in London. Mr. Gott is very favourably situated, close to the lake shore, and can of course ripen varieties that we cannot succeed in at all. Of Rogers' varieties, I think Nos. 4, 44 and 9 are the three varieties that I should prefer for table use.

Mr. Gott.—There is another very nice variety that comes under this head, and that is the Walter. It possesses very good qualities as a grape for amateur culture. We have not fruited the Brighton yet, but the vines are growing and doing well.

Mr. Switzer.—I am an amateur. In some sandy locations many grapes are apt to mildew, and although they will be good bearers they will have to be thrown out. My garden is clay, and I have no mildew in it. Raspberries will not wildew there. Nothing that I have mildews. I have tried many varieties of grapes, some have been thrown out. I have the Diana, and I have hardly been able to keep it within bounds. The stalks will grow almost any length, but there will be very few grapes on them. The few I have had were good. However, I have tried to cultivate it and give it such protection as I could, but it has been impossible to prevent it growing to wood. I like the Delaware very much. It crops every year. It is not so large as some of the other vines, but I like it for its sweetness and beauty. Rogers' Nos. 5 and 15 have been growing with me for some years, and they are very beautiful for the table—very beautiful to eat. I have grown the Sweetwater and the Golden Chasselas also. They are very fine grapes too—very nice for desert. I have the Concord and the Isabella also. I am glad to hear a good word spoken for the old Isabella. I think it is the best cropper I ever had in my garden, and I think it would be well if people would cultivate it. I grow a little for market, though I am mainly an amateur. Whatever is left from what my family eat we make into wine. The Clinton is the mainstay of the wine. We make about twenty gallons a year of it. We do not tap it until it is three years old, and then it is too good to sell any of it. I sometimes think that it is like the wine that Abraham and Lot drank, that makes the heart of man glad. I put nothing in the juice but the sugar, and there is not a headache in a quart of it. I have come in tired and taken a tumbler of it; and I think if there was more of that wine made it would do more good than all the temperance talk we hear. I will never drink any more wine in hotels. I used to, and once I sold it in my stores; but I do not drink any more in hotels, because it is not my wine, and it does not agree with me. Drinking my own wine makes me temperate.

Col. McGill.—This part of the subject interests me a little, the growth of grapes for amateur purposes. I have on my grounds some 22 or 23 varieties of grapes. I have 17 or 18 that are in bearing and have been for a good many years. They call me the king of the grape department in my country. The variety that I find most profitable is the red variety. I can sell my Salem and Rogers' 15 at from 15 to 20 cents a pound by the basket, while those that consume them can come up to Toronto and buy them at 6 and 7 cents a pound. I have an Isabella, and she is an enormous bearer, but she is a little too late. It is only occasionally that we can get her to ripen so that she is fit to use at all. I have Rogers' Nos. 3, 4 and 9. The 9 is a very fine grape on my grounds. I have no mildew whatever, and never have had any signs of mildew on any of Rogers' hybrids on my grounds. My soil is sandy loam. It is not underdrained, but there is no surface water. The exposure is rather northerly—northwest—one of the very worst exposures. No. 15 is not as prolific a bearer as I would like to have it. My Salems do well. I have good bunches on every vine; especially my prize bunches, which are sometimes a pound and sometimes over a pound. I never had any mildew on them but once, that was three years ago, a few spots that affected the fruit more than it did the foliage. The No. 44 I think very much of. It is a very prolific bearer with me. The Hartford Prolific is another prolific bearer with me. She is hardly second class, and I never can ripen her on my grounds before I ripen the Concords. The most of the grapes are on the ground when I come to gather them. I have been woefully disappointed in the Burnet, and that is the general experience of most cultivators of the Burnet in our part of the country. In some parts of the country it mildews dreadfully. In my garden (three years ago) there was a little mildew, and I removed it. It has borne for three years. The berries are very small, but they ripen and are very good. It stands just between

the Champion, the Hartford, the Delaware and the Salem, so that it has some good companions. The Brighton I think very much of. It is a very rapid grower on my grounds, but a shy bearer. The quality of the fruit, in my estimation, is very difficult to beat.

A MEMBER.—Is the Burnet a strong grower on your soil?

COL. MCGILL.—Yes. I have the Champion, and so far as dollars and cents are concerned, I make more out of it than anything else. A year ago last fall, when I was exhibiting at the county agricultural society's show, a gentleman came across my Champions. He helped himself to them, and said he, "that is the best grape, Colonel, I ever ate in my life." I said, "I am very much obliged to you, I never heard it get that praise before." I have no trouble in selling them for eight and nine cents a pound by the basket. I think very much of the Delaware. It is small. It bears very heavily, but we cannot sell the grapes for any more than the black. The Concord is, I think, so far as tested, the grape for the million. It is very popular, but I am inclined to think it will lose its laurels to the Worden Seedling. The Worden Seedling is, at least, ten or twelve days earlier, and equally prolific, if not more so; and I think in flavour a little better. My favourite among the reds would be Lindley (No. 9), and then the Salem. Then, the Lady Washington, so far as flavour is concerned, I think that there is nothing that can touch it. I have the Duchess, Prentiss, and friend Dempsey's No. 25. It has not fruited yet, but it has never shown the least sign of mildew on the foliage. I have fruited the Lady Washington. It ripened very well with me. I have fruited the Early Dawn and Moore's Early. I do not think so much of Moore's Early. I think more of the Early Dawn—of the fruit, but it is small in our section. It is the eye that has to be pleased more than the palate; they look at the size more than they consider the flavour. I have fruited the White Lady, and I like it very much. My grounds are very warm, and I train it pretty close. I have been trying this last few years to get the Niagara alongside of it. I would like to test it along with the rest. I have the Ann Arbour white grape from Michigan. It is a seedling from the Concord which has not fruited yet. I find most money in the Concord from its prolificness so far, because the others are just coming into bearing. Then come the Salem, Rogers' 15 and No. 9. They are red. I can sell them at any time from 12½ to 15 and 16 cents a pound in Oshawa, while they come to Toronto and buy what are supposed to be the same grapes and sell them for seven and eight cents.

MR. BUCKE.—I would like to say a word in favour of the Burnet grape, as an amateur grape, not a grape for the market. It has been fruiting down in Ottawa now for a couple of years, and it is very highly thought of by those who have fruited it. I do not know that it has been put on the market at all, but those who have grown it for themselves consider it an A1 grape. This year a great many of the berries on the vine had no seeds, and they were very small. I think this may be owing to some climatic influence in consequence of the shifting of the grape. We grow the Iona down there—a red grape—and we think a great deal of it for home use. It ripens with us very well if we do not let it crop too heavily. You should not have more than two bunches to every spur. They are also propagating down there. The Golden Chasselas de Fontainbleau, the Golden Chasselas it is called, is being very largely planted, and it sells very well. It is a white grape and the bunches are very large. Unfortunately the thrip has attacked it very much. We keep the grapes from being discoloured by the thrip by putting paper bags on them, and the bunches turn out very large and very fine. It is not only a good grape for private individuals, but it is a good grape to sell.

COL. MCGILL.—Another grape that slipped my memory—a new grape—that is bearing not far from me, is called the Janesville. It is a new seedling. It is earlier than the Champion—more prolific, and better and harder in the wood. It is enormously productive. It would only rank, however, as a second-class grape.

A MEMBER.—Do you grow that Chasselas De Fontainbleau without the use of sulphur?

MR. BUCKE.—Yes.

A MEMBER.—And does it never mildew?

MR. BUCKE.—No.

MR. ARNOLD.—Do you grow the Miller's Burgundy?

Mr. Bucke.—Yes. It is never injured by the thrip, and it bears very early, but it is so thick in the bunch that it bursts, and you must thin it or you do not get a crop.

Mr. Woodward being called on to address the meeting, said :—I do not know of any grape in the whole list that is not desirable for the amateur to cultivate. He will have all the pleasure of cultivating it whether he gets any fruit or not. But with the farmer it is a different thing. He wants certainty. He has not time to grow grapes for the sake of growing the vine. He wants grapes for his children, and he wants them in plenty. And there are only a few grapes that the farmer can grow to a certainty. If the thrip attack a grape badly it is worse for the farmer than for the amateur. If the Philloxera attack it that makes it worthless for the farmer also. The farmer wants a pure native American grape, with us, and I believe it is the same thing in Canada. Foreign blood is not for him. He wants something that is hardy, that is early, of which the quality is fairly good. I would not like to have my children learn to eat Champion grapes. I don't want them to eat anything that the hogs or the birds will not eat, and they certainly will not eat Champion grapes. Other grapes that mildew are good for nothing. The Hartford Prolific is not appreciated among the people for the reason that it drops badly, but if you take the Hartford Prolific, thin it out, and only let a moderate crop of fruit grow on it, it is not a bad grape—it is a hundred times better that the Champion. Farmers will not grow Delaware grapes. That variety of grapes must have a peculiar cultivation, and a peculiar position. It must be looked after carefully. But a farmer can plant the Concord, and, if he gives it a little care, he will grow Concord grapes for certain. There are some newer varieties that I think will be as early and as productive as the Concord, among them is the Worden. The Moore's Early, while it is earlier than the Worden, is not a grape that I would recommend. It cracks so badly, and it drops so badly. If it is not properly pruned it drops as badly as the Hartford. In quality it is not good enough. It is not as good as the Concord, nor beginning to be. The Rogers' hybrids we cannot grow for family use. They must have more care than the ordinary farmer will give them. So with the Burnet. We tried them over there with us, and they mildew very badly. I know of very few new grapes that it would pay anybody to plant them for family use or for farmers' use.

Mr. Willard was also asked to speak, and said :—The wind has been pretty much taken out of my sails by those who have spoken. I have to speak from my own standpoint, and what I may say should be taken with a great deal of latitude, there being such a difference of soil and climate, even in localities so near together as that in which I live and Canada. There were certain general principles advanced by my friend, Mr. Woodward, that carry a great deal of weight with them. I think with him in meetings of this kind we ought to recommend something that will please, something that is adapted to the masses. The people generally do not discriminate with that nicety that your President or Secretary, or Mr. Woodward would. My own idea is that you have got to go to the Concord parentage or that type for those varieties of grapes that are adapted to the masses. I have studied that subject so much that I may have got into a rut, but if I have I cannot get out of it very well. I cannot get rid of the idea that we must stick to a certain type of grape to give the people the kind they want. In my opinion we want a good dark grape, the best; we want a good amber coloured grape, the best; and we want a good white grape, the best; as the best adapted to the masses. I have found in my experience that all our hybrid grapes that have been crossed with foreign blood succeed in some localities admirably, and ten miles away are a failure. I fear that, with regard to some of our newer varieties of white grapes; I fear, that with regard to the Prentiss for instance. I have no doubt whatever but what the grape, of which my friend Mr. Woodward is the advocate, will succeed well anywhere, because it has the right parentage. And I believe that true in regard to the Pocklington. I believe it is a good grape; and I believe it will succeed well, because it has the right parentage at the bottom of it. I believe that for an early grape, we have, perhaps, nothing better than the Worden Seedling. I believe I planted it among the first vines sent out by Mr. Worden, and it has succeeded well with me. I desire to mention a new amber-coloured grape which I believe is going to make its mark—that is, the Vergennes. I have no interest in it, but it ripens early, and also keeps till very late. It originated up in Vermont. It ripens

with me about the same time as the Concord does, and it will keep till February most beautifully.

Mr. Haskins.—We know that in Europe, in the best grape-growing localities, they cannot grow grapes in every field, or on every part of a farm; they must have fields with an eastern or southern exposure. If they did not do this, but planted their vines on the tops of hills where there was no protection from the winds, they would fail to grow grapes. I think, if in this country we looked for suitable locations, or planted artificial protection on the north and west, and took the same precautions that they do in Europe, we would grow almost all our native grapes in the open air. In that case I think there are many varieties that we could successfully grow out of doors. There is the Iona, in this district, and from here to Niagara, I look upon it as very valuable if it is not allowed to overbear. The Delaware can be grown out of doors with a little precaution in this section of the country, and it will succeed well if not allowed to overbear. The Concord will grow almost anywhere. I think if we look for protection on the west and north—windbreaks of evergreens, or a hillside, or a fence—we shall succeed with most of Rogers' hybrids, the Iona, the Concord, the Delaware, and many other varieties.

WHICH VARIETIES OF GRAPES ARE THE BEST FOR WINE-MAKING?

Mr. Haskins, in introducing this subject, said: So far the grape that I have used for wine-making is the Clinton, for the most part. The fruit ripens on arbours, and is left till the frost touches it, and is then mixed with other varieties.

A Member.—How do you find the Delaware to compare with it as a wine-making grape?

Mr. Haskins.—Of itself I do not think much of it, but mixed with other varieties I think it is very good.

A Member.—Do you use the Concord to any extent?

Mr. Haskins.—Yes; it is very good to use with the Delaware. There is a great deal of flavouring matter about the Concord, and very little about the Delaware. Put them together and they make a very fine wine. And I think the Niagara probably, when we can get it, will be a good kind to mix with the Delaware for flavouring. I think I have not anything to say as regards wine-making but what you have heard or read before on the subject.

Mr. Bucke.—Mr. Haskins, there is some insect which attacks the Clinton, and the berries do not ripen on the bunch. How do you find about that?

Mr. Haskins.—If you will let them hang till the frost touches them, I think they will be pretty well withered up, they will not do any damage. I think clean cultivation will get rid of the thrip. Some say not, but I have no other theory about it. I think I find that ploughing in the fall and burying the leaves destroys the thrip.

Mr. Bucke.—Is the sale of native wine increasing?

Mr. Haskins.—I think so; very much.

Mr. Saunders.—It was a marvel to me to see Mr. Haskins' garden almost clear of thrip last year when I went to see it. I think the reason is what is given. I did not see any rubbish about the place—any dead leaves or anything of the sort. The thrip lives through the winter, and, if there is no hiding-place for it, it has to emigrate to where it can get shelter, or die.

Mr. Gott.—We find the more we cut or prune the Clintons, the more they grow to wood.

Mr. Haskins.—We grow the Clintons on eighteen-foot span arbours, so that the horses can travel under.

Mr. Gott.—Then you do not prune at all?

Mr. Haskins.—Yes; we prune once a year.

Mr. Gott.—No summer pruning?

Mr. Haskins.—We thin them out.

Mr. Saunders.—But not the wood?

Mr. Haskins.—No. I think we have new grapes coming on that will make a wine that will rival the best imported wines. A short time since an English gentleman, who

had lived very many years at Oporto as the agent for an English wine house, called on me, and I showed him a native port wine that he thought very well of. He did not think that it was grown in this country. It was made from a new grape that I am growing myself. I do not want to sell the plants; I want to grow all I can of them myself. The grape is called the Abyssinnian. I exhibited it at London last year.

Mr. Switzer.—I think it would be a good idea if everyone who grows grapes would make wine for the sake of the effect it would have in promoting temperance. It was a very difficult matter at first to make wine, because we got the idea that the grapes had to be squeezed through cloths. Then, when it was put in the barrel to ferment, it had a great deal of impurity to throw out, so that it would be months before it purified itself. We have now got over that; and, after using all the grapes that we require for our house, we mix together all that are left and put them through a sausage-machine, and that breaks every one. They are then thrown into a large tub with a tap to it, and to keep the must from getting into this tap we put some twigs of the grape-vine over it, so that the liquor may percolate through that. In the course of a few days the wine comes to the top and the skin begins to drop. That is the proper time to turn the tap, and when it is turned then you would be astonished to see how dry it would drain. Sometimes we put a gallon of water in, and it hardly comes out coloured. If we want to have a dry wine or a sweet wine we then put the sugar in and put the wine away in our casks. It soon effervesces a little—it has nothing more to discharge—and in the course of a few weeks we put the bung in a little, so that in case of any further effervescing it shall not blow out the end of the keg. The older the wine the better, but in the course of three years it is good. You may open it sooner if you like. If you let it go to four or five years, though, and then bottle it off, you will have a wine that you will be surprised at. I do not put anything to it but the sugar. If I want a dry wine I put in a pound, if a sweet wine three pounds to the gallon. The amount of sugar depends greatly on the amount of sweet grapes that I put in the mixture. I am indebted to Mr. Haskins for a hint he gave me. Three years ago he took me down to his vaults and gave me a bottle of wine to take home. I brought him back a bottle in return. Mr. Haskins tested the wine, and he told me exactly how it was made. He said, "you do not reduce it." I said, "no." He said, "you put brown sugar in; you should not do that." I said I thought there was more sacharine matter in the brown sugar than in the white. He told me that was a mistake; and I use white sugar now.

Mr. Bucke.—In putting the grapes through the machine, do you break the seeds at all?

Mr. Switzer.—No. The object of putting them through that was to break the grapes. Even if it did break the seeds, they would not run out through the tap. The wine percolates through the twigs, and comes out perfectly pure. They use something like that in the old country in the making of beer.

Mr. Haskins.—Might it not be better to press them through a very coarse sieve than through a sausage-machine?

Mr. Switzer.—That might be done, perhaps; but we put the machine over the tub, and grind them through it.

Mr. Beall.—Don't you press the grapes at all after they are ground?

Mr. Switzer.—No.

Mr. Dempsey.—I have been cultivating grapes ever since I commenced cultivating fruit. Then my first experience was only with three or four varieties, which, I believe were then the only varieties in cultivation in America. I then resorted to exotic varieties, cultivating them under glass. It always delighted me to treat my friends as well as I could, and we frequently used on the table exotic grapes—the finest we could grow, mixed with some of the hardiest outdoor varieties—even sometimes Hartford Prolific—and I have seen friends select the Hartford Prolific as the best grape. So that it seems as though it must be left to everybody to select the fruit that suits him best. For my own taste, and for many persons', as an amateur grape I would take, first of all, the Worden for an early grape. I find nothing that I have fruited superior to it. There are several varieties, however, that I would be very sorry to reject. There are several of my seedlings that I prize very highly as amateur grapes. I prize the Brighton very highly

as an amateur grape. It matures sufficiently early, it looks very nice on the table, and none of us is going to object to its flavour. I prize the Walter also very highly as an amateur grape. It is almost useless for marketing purposes. It does not require very high culture, neither does it require with us very careful culture. I would never reject the Delaware for amateur culture. It is one of our grapes. I was very agreeably disappointed this year when I fruited the Pocklington. I found it mature with us earlier than the Concord, and it suited nearly every persons' taste, who had the privilege of tasting it on our grounds. When we come to Rogers' hybrids we find several varieties that are appreciated; but I must confess here that I do not appreciate any of them—they leave an unpleasant sting about the tongue, that I do not care for at all. Still, some of them, on account of their keeping qualities, we can enjoy after all the other grapes are gone. They are of no value to us where we cultivate the Burnet. I cultivate the Burnet largely and successfully, and I do not know how long it can be kept. I have never seen it spoiled, and I have never seen a spoiled berry on it yet. We do not suppose it is going to succeed in every section of the country, but, as an amateur grape, I would be very sorry to do away with it on my ground; in fact, I could not.

Mr. Saunders.—Does it mildew with you?

Mr. Dempsey.—I have seen some of Rogers' hybrids, the varieties I have just spoken of, mildew. I have seen the Burnet vines growing in among them, and not one particle of mildew on it.

Mr. Haskins.—I can say the same thing.

Mr. Dempsey.—I am not going to say it is exempt from mildew, because, I believe, every variety of grape, to a greater or lesser extent, is subject to mildew. This year, when the Burnet was in blossom, there came a very heavy rainstorm, and the pollen seemed to be carried off, not only from the Burnet variety, but from every other variety that was in blossom at the time. The Burnet went on, and produced a very small berry without any seeds. My No. 25 I have fruited extensively, and I have fruited it so that I have sent it to market, and it commanded the highest price this year of anything that I sent to the market. It is one of the hardiest grapes I have, and one of the most rapid growers. It is also one of the most productive varieties that I have, and, if thinned, it ripens very well with me; but it is inclined to be late. It is a very high-flavoured grape. I sent a sample of it to Mr. Saunders in the fall, and I presume that he can give a better opinion of it than I can, for the reason that we are all liable to cultivate our taste to a certain variety—we can cultivate a taste even to like tobacco. No. 6 is a very rapid grower. It is the Delaware crossed with Allen's hybrid. It is a very early grape. It is the earliest grape we cultivate; but it drops off the bunch very early. It is a small grape, a little larger than the Delaware, but it is almost a white grape.

Mr. Saunders.—In regard to the samples of this white grape sent to me by the President in the summer, I must say I was favourably impressed with it. The berry was about as large as the Concord, a little more oval in form, and sweet and good in every respect.

Mr. Dempsey.—In justice to another Province (Quebec), I have this to say: Mr. Bucke was speaking of cultivating the Royal Muscadine in Ottawa—the Chasselas de Fontainbleau, or Golden Chasselas, I think he called it—they are all the same thing. If you look at the report of the Farmers' Association from Abbotsford, in Lower Canada, you will see that there are a large number of exotic varieties there that they are succeeding with; and they can actually cultivate some varieties of grapes that we cannot succeed with here at all. That is the fact in the vicinity of Ottawa, on these south-eastern slopes, where the soil is largely composed of a shaly, slaty rock. Grapes will mature there earlier, and they are finer than we can produce. The farther we come south, the more liable does fruit appear to be attacked by mildew. I am not surprised at our American friends feeling astonished at seeing us growing and succeeding with grapes in the open air. It only makes us feel prouder of this Canada of ours.

Mr. Arnold.—We do not succeed in growing the Muscadine in our section of the country satisfactorily; but, there was a white grape, sent out by some gentleman in Hamilton, some twenty-five years ago—by Mr. Fairman—called the Canadian Chief, which is much more hardy than the Royal Muscadine. It is not so liable to be injured by the

thrip. The parentage of it I do not know anything about. I feel sure it would succeed with Mr. Bucke far better than the Sweetwater or the Chasselas. I endorse very much what our American friends say with regard to this Labrusca family. There is no doubt that they will succeed better than others where the thrip prevails.

Mr. Wellington.—With regard to the amateur, I think he must decide for himself, to a great extent, what grapes he will cultivate. Some will praise one variety, while others condemn it, as my experience shows. I was pleased to hear the remarks in favour of the Worden. That is a grape that I noticed for the first time this year, particularly. I think myself its quality is better than the Concord. Its productiveness is probably not up to that of the Concord, but good. It ripens early, and then, late in October, in going over our grounds I have found good samples of it, and they have tasted exceptionally good. The Brighton, I think, is another that should be in every amateur collection. If you take into account what a farmer would cultivate, I do not think that, for general culture, the Brighton would suit him—and I do not think it would suit every section—but an amateur would like it. It will not keep, however, and must be eaten when ripe. I have eaten Champions that have been equal to Concords, and I have eaten Champions again that would make a pig squeal. The first Champions I ate came from Charlotte, and at that time I thought the grape was totally useless. After that I ate some that had been grown a little north of Richmond Hill ; and the flavour was equal to that of the Concord. They ripen a little later there ; and, being hardy, I formed the idea—and I hold it still—that in a great many sections, where other grapes cannot be grown, it is a valuable grape. When you come to talk about a grape, which is for the masses, I agree that you have to get a grape with a native strain in it ; and nurserymen and others are now working on such grapes that I think there is a class coming forward that will be very valuable, especially of the white grapes. Of course, being interested in a white grape, I do not wish to say anything about that kind. I think, in the end, the best grape will come to the surface, and will be recognised, and in the hands of the public. I believe that, besides the grape I am interested in, there are others that will be very valuable. I believe, also, that in other colours we shall have grapes that will do away with a great many varieties that are now being cultivated.

Mr. Woodward.—I was in Montreal last summer and I thought I would look up the Champion ; and they told me the fact was that the Champion grape coming into Montreal market had crushed the whole black grape market. Everybody there thought every black grape was the Champion. One gentleman at Chateauguay told me that, if they had never put a Champion grape in the Montreal market, it would have been hundreds of dollars in his pocket every year.

It being one o'clock, the meeting now adjourned till two o'clock.

After the adjournment,

A committee to examine the fruit on exhibition was appointed by the President, consisting of Messrs. William Saunders, S. D. Willard, and A. McD. Allan.

CLEMATIS.

WHICH VARIETIES OF CLEMATIS ARE BEST FOR CULTIVATION IN ONTARIO ?

Mr. Bucke, in introducing the discussion, said : I have not much to say about the Clematis—merely that the Jackmanii appears to be perfectly hardy with us, and I presume others are quite as hardy. I have seen the Clematis in England. The white varieties grow very beautifully over the houses there in the south of the island. I have seen Mr. Wellington's catalogue, and, I have no doubt, he can say something about the Clematis.

Mr. Wellington.—I suppose my report last year covers the ground about as well as I am in a position to do now, with the exception of some of the newer varieties, and those, as I was appointed chairman on the committee on climbers this year, I have taken

up in my report, and probably when that is read the discussion might be brought forward with regard to the Clematis.

The PRESIDENT.—If you are ready, I would suggest that we have your report.

MR. WELLINGTON.—It is not ready yet, but will be in a few minutes.

MR. WILLARD, being called on, said: I do not know of anything new in regard to Clematis. I do not know that I can say much to the edification of the gentlemen present, except that I yet think there has nothing been brought out in the shape of a coloured Clematis that is superior to the Jackmanii. There may be others being brought out in England that will supercede it, There are white ones that are desirable, but I do not think any of them have met the views of the people so well as the Jackmanii.

MR. BEADLE.—I think Mr. Wellington has probably told us correctly that his report last winter has covered the ground very fully, and I only wish to emphasize one point with regard to it. As far as my experience goes it is this—that I think our Canadian people will be more likely to succeed well with those varieties that bloom upon the new wood. There are two classes of these Clematis. One variety blooms upon the new wood, and the other upon the old wood. In the family that bloom upon the new wood, even though they should get somewhat injured by the winter, or by any other cause, the young wood will throw out its shoots—from the root even—and bloom freely throughout the summer; and if well fed, so as to be kept vigorously growing, they will keep on blooming all through the season, with very little intermission. I fear that if our buyers and planters should get on to the varieties that bloom from the old wood they might be disappointed; perhaps the plants might get winter killed in some severe winters.

MR. SAUNDERS.—I admire the Clematis very much as a class of plants, and have found them very satisfactory indeed as far as the culture of them has gone with me. I have not had many varieties. I have had the Jackmanii for a long time, and that is one of the most satisfactory of all. I have had Tunbridgensis, and it is another one that I have found very good indeed. I have also had two white ones, which I cannot recollect the names of just at the present moment. There is another variety of Clematis that is extremely hardy and very ornamental when in fruit. I have forgotten the name of it for the moment. The flower is yellow, and when in fruit it becomes a mass of those delicate feathery fruit heads, which are of a very brilliant silvery cast. When the sun shines on them they present a very beautiful appearance. We have it in our Mount Pleasant Cemetery in London, and it is one of the things which attract the most attention, I think, of any growing on the ground while it is in seed. The flower is inconspicuous—a dull yellow—and while it is in flower it does not attract much attention. Our native Clematis, the Virginana, blooms profusely, and has quite a pretty flower. It is very useful as a covering for unsightly objects. Then there is a bluish purple one that is native to this country, that grows from Maine to Wisconsin, called the Bordicillerous, which we have cultivatëd to some extent. But there is none of them that is so handsome or so wonderfully covered with blossoms as the Jackmanii. I have found no trouble in growing them, they grow without protection. They shoot up from the base every year, they usually die down to the ground, and send up new shoots which blossom on the wood, commencing, I think, about the beginning of July, and continuing blooming for about two months, during which the plants are perfect pictures of beauty.

MR. WELLINGTON here read the report of the Committee on Climbers.

REPORT OF COMMITTEE ON CLIMBERS.

Nothing in the floral world has added more to its beauties or is more varied in their uses than the long list of climbing plants of various kinds, and yet no class of plants are more neglected than many of our most valuable climbers—whether it be the "Ivy Green" of the old song, the magnificient and brilliant beauty of the gay Clematis, the graceful Wistaria, the modest Honeysuckle with its wealth of intoxicating fragrance, or the odd,

yet attractive Dutchman's Pipe, they are all too frequently absent from our gardens. There are so many positions in which they can be utilized, both for adding to the beauty of a place, or hiding a defect, that one is often surprised at the want of taste—shall we say—in the laying out of our gardens and grounds. For rockwork, for hiding an unsightly stump or building, and turning it into a thing of beauty, for trellis or pillar, for bare walls, for the arbour, and even for bedding plants, there are some of our climbers specially adapted; nor must we forget the gorgeous Rose, the climbing varieties of which belong to this Report. There is the blushing Anna Maria, with its well formed and large clusters of bloom, the bright rosy red large, compact and globular Queen of the Prairies, the carmine crimson Gem of the Prairies, and the modest white—the finest of its class, the Baltimore Belle, all belonging to the hardy Prairie Roses (*Rubifolia*). Then there is the Ayrshires which from their slender growth are more properly speaking running roses, and are best for covering banks, buildings or unsightly objects; they are also remarkable for succeeding in the poorest soil. Will often run twenty feet in a single season. Of these we would recommend Bennett's Seedling—pure white; Queen of Belgians—pure white; Queen of Ayrshires—dark purple and crimson.

The Noisette, Tea and Banksias of climbing habit, we will pass over as our report will be more particularly given to hardy out door climbers. From Roses we pass on to our best deciduous climbers.

DECIDUOUS CLIMBERS.

Akebia Quinata.—A singular Japanese, climbing plant, with neat shining sub-ever green leaves, and purple flowers, perfectly hardy, and worthy of more attention.

Ampelopsis Quinqefolia (*Am. Ivy or Virginia Creeper*).—One of the best known as well as most valuable trailing shrubs, beautiful digitate leaves, turning to rich crimson in autumn. Has tendrils and clings like the Ivy, and is excellent for walls, and screens, arbour, and verandah.

Ampelopsis Veitchii or Japan Ivy.—The best of all foliage climbers for outer wall decorations. Leaves smaller and finer than Virginia Creeper, forming a dense sheet of green; clings with the utmost tenacity to brick, stone, or wood and even iron, foliage turns to a rich crimson in autumn, grows rapidly when once established. Many specimens of this plant can be found covering scores of yards of surface with bright glossy foliage. Invaluable for the walls of churches and public buildings.

Aristolochia Sipho (*Dutchman's Pipe*).—A native plant of climbing habit. Rapid grower, with large dark green foliage, ten or twelve inches in diameter and curious pipe shape, yellowish brown flower in July.

Dolichus Japonicus.—A new and rare climber of immense growth, covering twenty feet in a season, and having long racemes of purple and white flowers (Wistaria like), excellent to cover rocks and stumps.

Hedera, Ivy.—There are many varieties of this, not a few of which are too well known to need mention. Among the latest and best is New Silver Striped. Body of leaf deep green heavily bordered with white, clean and distinct, and a very fair grower. There are a number of kinds having silver margined leaves, but none equal to this in size of foliage, vigour of habit, and beauty. Other sorts are veined and spotted with yellow, and are very beautiful for house plants. All varieties of the Hedera, we believe, are too tender for outdoor cultivation in the North.

Hydrangea Scandens. (Japan Climbing Hydrangea).—This is a new and very rare plant, the merits of which have not been fully developed. Thos. Hogg describes it as clinging to trees to the height of fifty feet, producing corymbs of white flowers of the size of the ordinary Hydrangea, leaves cordate, sharply toothed, longstalk, dark green, slow growing and possibly a little tender while young. We have not flowered this plant but have it growing, and are favourably impressed with its appearance. If hardy, and having the beauty of flowers of Hydrangea Paniculata, it will be a most valuable addition to the list of climbers and no doubt become immensely popular.

Jasminum Officinalis (*White Jasmine*).—Not entirely hardy, requires southern exposure, delicate and beautiful foliage and flowers, fragrant white, blooms in July.

Loniceras.—A few sorts only of these are necessary to mention.

L. Halleana (*Hall's Japan Honeysuckle*).—A strong and vigorous evergreen sort, with flowers white, changing to yellow; very fragrant, and in profuse bloom from June to November. We consider this the best of the Honeysuckles, and most admirable for rockwork, screens, walls, and fences.

Lonicera reticulata (*Golden Leaf Honeysuckle*).—Leaves distinctly and finely veined with fine golden lines, foliage small, and growth moderate, makes a beautiful bed or border plant, as well as desirable for screens, and walls, hardy, and one of the most beautiful of its species.

Lonicera Semper virens (*Scarlet Trumpet Honeysuckle*).—Strong rapid grower, blooming all summer; flowers without fragrance, but this and its varieties have the handsomest flowers of all the Honeysuckles.

Lonicera Sinensis (*Chinese Honeysuckle*).—Dark green foliage which hangs very late, blooms in July and September, and is very fragrant. A very popular sort.

Periploca Græca (*Silk Vine*).—A rapid growing beautiful climber, native of Southern Europe. Will twine around a tree thirty to forty feet high, foliage long narrow and shining, flowers purplish brown, in clusters.

Tecoma or Bignonia (*Trumpet Flower*).—Strong growing showy flowers—scarlet crimson and orange, good either for trailing or as standards.

Wistaria Chinensis (*Chinese Wistaria*).—Rapid growing, and elegant, attaining an immense size; has long pendulous clusters of pale blue flowers in May or June, and in Autumn; it may be grown as a standard.

Wistaria Chinensis Alba (*Chinese White Wistaria*).—The best white Wistaria, habit not so strong as the blue, but fair grower, and blooms freely, a little tender when young, needs high culture and a little protection until well established.

Wistaria florepleno (*Double Purple Wistaria*).—A charming new variety with perfectly double flowers, deeper in colour than the single. The plant is perfectly hardy, and like the Sinensis in habit. The most valuable of the Wistarias, and will be in great demand when better known,

Wistaria Magnifica.—Flowers in dense drooping racemes, of the same size as the Chinese, and of a pale lilac colour. Foliage of the same graceful habit as the American. Vigorous and hardy.

Clematis Montana.—A remarkably free growing Indian climber well adapted for trailing over walls and trellises. The flowers are white with a dash of pink and tuft of straw-coloured stamens; sweet scented and very copious—the branches literally becoming converted into floral garlands.

Clematis Virginiana.—Another of the strong free growing sorts, having small fragrant white flowers, and excellent for screens and walls.

We think these varieties of Clematis are deserving of more than a passing notice. At the time when the Virginia Creeper is turning its foliage, C. Montana, and Virginiana are in full bloom. They are quite as vigorous in growth as Virginia Creeper, covering an immense surface, and the great profusion of their fragrant flowers, in the form of a dense spray, make them remarkably beautiful. They are extremely hardy, enduring any climate without injury. We can most safely recommend them to any who have walls or screens, or unsightly places to cover, or who wish a hardy free growing beautiful climber.

The already long list of Clematis is being yearly increased by contributions from the best English growers, most prominent of which are Geo. Jackman & Son, and Thos. Cupps & Sons.

Much attention seems to have been directed, and with considerable success to the

production of the double flowering sorts, all of which, however, are of the Patens or Florida type, and these free summer bloomers only.

We give descriptions of some of the newest and choicest introductions.

NEW SORTS.—PERPETUAL BLOOMING CLEMATIS.

Duchess of Teck.—A pure white, with a faintly delicate mauve bar. Awarded a first class certificate by the Royal Botanic Society.

Duke of Norfolk.—A very deep mauve colour, with a broadish pale bar, the anthers are dark coloured.

Earl of Beaconsfield.—A rich royal purple, splendid form. First class certificate from the Royal Horticultural Society.

Lilaciana Florabunda.—Pale grey lilac, deeply veined, and abundant bloomer; a fine contrast to C. Jackmanii for bedding purposes.

Grand Duchess.—A splendid variety with flowers about nine inches across, blush white and of good quality. First class certificate, Royal Horticultural Society.

Guiding Star.—Purplish hue, shaded with crimson, maroon band down the centre of each petal. First-class certificate, Royal Horticultural Society.

Louis Van Houtte.—A strikingly showy variety with bluish purple flowers.

Lady Caroline Neville.—Beautiful bright mauve, with deeper bars. First-class certificate, Royal Horticultural Society.

Lord Neville.—Flowers large and well formed, colour rich dark plum. Stamens light with dark anthers, edgings of petals finely crimped. First class certificate, Royal Horticultural Society.

Othello.—Flowers medium, a good shaped six petalled variety. Late and very free flowering, colour velvety purple.

Purpurea Elegans.—Deep violet purple, light coloured filaments and pinkish brown anthers. First-class certificate, Royal Horticultural Society.

NEW SORTS.—DOUBLE FLOWERING SUMMER BLOOMING CLEMATIS.

Countess of Lovelace.—A decided advance on John Gould Veitch, both in habit, colour, and form, a bluish Lilac, rosette shaped, forming a double flower.

Belle of Woking.—A fine double variety of the Florida type, with about eight series of sepals, and a small tuft of stamens. The colour is a charming delicate but decided tint of bluish mauve or silver grey, the innermost sepals having here and there a dash of reddish lilac, the filaments white, supporting cream coloured anthers.

Enchantress.—A very large and distinct variety, good habit, bearing very double white flowers; the exterior petals are very prettily flushed in the centre with rose. First-class certificate, Royal Horticultural Society.

Venus Victrix.—Another double variety, but of a delicate lavender colour, having sepals very broad and finely formed. First-class certificate, Royal Horticultural Society.

INDOOR CLIMBERS.

Of the indoor climbers, there are few that thrive with ordinary house culture if we except the Ivies. Of these

Helix Tricolor (*Tricolor Eng. Ivy*).—With its leaves of green, white and rose.

H. Canariensis or Hibernica (*Irish Ivy*).

" *Var latifolia maculata* (*Broad Leaved Variegated Irish Ivy*).—With broad leaves, distinctly variegated.

H. Picta.—Small leaves, fine lobed, and

H. Roegneriana or Colchica (*Giant Ivy*), with large thick leathery leaves, are the best.

There is however, one plant which should be in every collection of indoor plants and which seems to do well with ordinary culture, and that is;

Manellia Bicolor (*Origan Rio Janiero*).—Named in honour of Xavier Manette, prefect of Botanic Gardens at Florence; one of an elegant family of greenhouse climbing plants, suitable for training over a wire trellis, attached to the pots in which they grow; it delights in a moderately warm and moist atmosphere. It is a winter flowering plant, the flowers are scattered thickly along the vine, colour scarlet tipped with yellow covered with fine hairs that resemble the marking on a butterfly's wings, the whole flower of a waxy texture, tubular in shape, terminating in four short points, giving it a square appearance from the face.

W. E. Wellington.

Among our native climbers, there are several sorts deserving of notice. First, among these we would place the wild Yam (*Dioscorea Villosa*), a perennial plant, with thick, fleshy, knotted roots, which send up early in spring a number of rapid growing shoots, which soon develop, leaves strongly netted veined and wonderfully beautiful, these leaves overhang in a regular symmetrical manner, the colour of the leaves is a deep rich green, the flowers are small, whitish and inconspicuous, found throughout the southern part of Ontario.

Celastrus Scandens (*False Bittersweet*).—A rapid young climber with handsome foliage; flowers green and insignificant, followed in the autumn by bunches of berries of a brilliant scarlet.

Menispermum Canadense (*Moonseed*).—A very pretty climber, with large and pretty foliage of a rich green colour, which twines around trees and tall shrubs in our woods; the flowers here are also inconspicuous.

Adlumia Cirrhosa (*Climbing fumitory*).—A biennial climber, common westward, but not found as far as we know in Ontario. The foliage of this plant is very beautiful, finely cut, and a very free bloomer, flowers formed as in Dielytra spectabilis, and of a yellowish white colour.

W. Saunders.

Saunders.—The Clematis, the name of which I was trying to recall a little while ago, is the Graveolens, the yellow flowering one. The Periploca Græca has been growing with me for some years, but I have never had it flower. It is a very rapid growing climber, and I think it is one that deserves to be well known.

Mr. Beadle.—I move that this report be received with thanks, and be handed to the Publication Committee to to be incorporated in our annual report.

The motion was seconded and carried.

FENCES.

Mr. Beall submitted the following report from the Committee on Fences:—

ROAD-SIDE FENCES.

The Committee to whom was referred the report of the Committee on Fences at our last winter meeting, with instructions to furnish such facts, figures or circumstances as led them to the conclusion arrived at in that report, now respectfully submit,

1st,—That every farm of 100 acres, divided in the usual manner will have about 1,200 rods of fence thereon.

2nd,—That one of the best and most economical fences now coming into general use is a straight one, made of cedar rails and posts. It is usually built five rails high, the ends of the rails being inserted into augur holes in the posts, which are set firmly in the ground, in line, 12 feet apart.

3rd,—The cost of such a fence for a farm of 100 acres will be about as follows :

8,250 Rails at $52 per 1,000	$429 00
1,650 posts at 18 cents each	297 00
Digging holes and setting posts at 10 cents each	165 00
Boring holes in posts at $1 per 100 holes	82 50
Cutting and turning rails, at $1 per 100	82 50
Setting up the rails at 10 cents per length of 5 rails	165 00
16 Gates. Hung and painted at $6 each	96 00
	$1,317 00

or about $1.30 per rod. Such a fence is estimated to last about 25 years. The gates about 10 years.

4th.—The annual charge for permanent maintenance of such a fence will therefore be :

Interest on (say) $1,300 at 6 per cent	$78 00
Estimated average annual charge for repairs and for permanent maintenance at 6 per cent	78 00
Extra, do. do. for gates, 10 per cent	9 60
Rent of land, lost by fence 6 feet wide—4.36 acres at $5 per acre	21 80
Total	$187 40

The foregoing estimate has been made with the assistance of a thoroughly practical farmer in the Township of East Whitby, and we are of the opinion that although the cost of such a fence must necessarily vary much in different localities, the cost of material and labour here submitted may be regarded as a fair average for the whole Province.

5th.—Your committee are of the opinion that the kind of fence as usually constructed in the back country involves a much greater annual expenditure than the one here described. A common snake fence of the same length will require about 26,000 rails, which are usually made of basswood, pine, elm, ash, &c., &c. Supposing these to be hauled a distance of one mile, they will cost about

$30 per M., or	$780 00
Labour in setting up at $4 per 100 rods	48 00
Preparing and setting 16 sets of bars at $2 per set	32 00
	$860 00

Such a fence is estimated to last about 10 years, the bars about half that time. The annual charge for such a fence would therefore be :

Interest on $860 at 6 per cent	$51 60
Estimated average annual charge for repairs and for permanent maintenance 15 per cent., or	129 00
Extra, do. do. for bars 20 per cent	6 40
Rent of land, lost by fence 12 feet wide—8.72 acres at $5 per acre	43 60
Total	$230 60

showing an annual expenditure on a farm thus fenced of $43.20 for permanent maintenance, greater than on the fences first described.

6th,—The estimate, therefore, in the second paragraph of the previous report of two dollars per acre per annum seems a moderate one, and your Committee are of the opinion that if farmers were not compelled to fence against their neighbour's cattle, they would protect their crops and their own cattle by live fences of trees forming wind breaks; by the use of hurdles, and otherwise, (which would add much to the general beauty of the country and thereby greatly enhance the value of the land) at less than one quarter of the yearly expenditure above shown, or—in other words—that the farmer of every 100 acres of land in Ontario could realize a clear yearly profit, over and above what he is now doing (if every owner of stock were compelled by law to keep them enclosed), of $150.00.

7th,—That the foregoing figures showing the unnecessary but compulsory annual expenditure of $1.50 per acre for all cultivated land, by the unwise laws at present in force in this Province, have been carefully prepared, and therefore, by applying them to communities of farms, we find that the annual loss from this cause to the large Township of London in the County of Middlesex,—having a cultivated area of nearly 70,000 acres—is over $100,000. The Township of Mariposa, in the County of Victoria, having cleared land to the extent of nearly 48,000 acres, looses $72,000 annually. The Model Farm at Guelph losses by the same means annually about $800. These figures when applied to the whole Province assumes gigantic proportions, for we find from official reports that there are at the present time between eleven and twelve millions of acres under actual cultivation. The total loss, therefore to the farmers of Ontario must be upwards of $16,000.000 per annum.

THOS. BEALL, *Chairman.*
P. E. BUCKE,
THOS. HALLIDAY WATT.

COL. MCGILL.—I understood you to say that the old snake fence lasted ten years. I used to be a practical fence maker. I was brought up in the woods. I came into Canada in 1820, and settled in the Township of Pickering when it was almost in a virgin state, and I know a little about making fences. I have been married now 47 years, and I built a fence some time before I was married, and it has never been made over from that day to the present. It keeps all the cattle in.

MR. BUCKE.—What wood is it made of?

COL. MCGILL.—It is made of pine and cedar.

MR. BUCKE.—Is it staked and ridered?

COL. MCGILL.—It was staked and ridered at first; but the stakes have been down these last fifteen years. It has never been repaired; it has never broken down to the bottom rail, and there is a northwest wind with a sweep of four miles that rakes it. There is a good deal of fault found with the timber, whereas it is the men who use that timber and put it up who are to blame. If the rails for a rail fence are cut at the proper time of year, and properly split and put up, the fence will last twice as long as if they are not. A worm rail fence costs more in its first construction than the fence of which Mr. Beall was speaking. There is a large proportion of that fence being built in the Township of East Whitby that will not last half as long as a worm fence. It does not occupy as much ground; but there are six feet of ground even at a straight fence that is not ploughable, because you have to keep far enough away from your wires for the end of your whippletrees. There is a little more than that in a worm fence; but you can get right up to a worm fence. Six hundred and fifty twelve-foot rails will make a worm fence forty rods long and four feet high if the rails are what they ought to be; and a rail fence put up in that way will last as long as two straight fences, because the posts of the straight fence will decay in one half the time between wind and water. The first fence spoken of is not as good a fence. It is not as durable a fence, from actual experience, as to take two posts and set them in and put rails between them. The tenon is only two inches that goes into each post—though sometimes about four, when you happen to have an extra sized post

—and then the merest sag of a post will let the ends drop out. It is then almost impossible to get them replaced again, because your posts are supposed to be fast at both ends. Now, if you are ascending a lofty hill or going down a decline the posts are not perpendicular. If they are they have not got a hold, and the moment one begins to sag, out comes your rail. There are hundreds and hundreds of rods of it in East Whitby that is not going to last half the time that the ordinary straight fence fastened with wire is, and just from that very fact. I have never seen a rod of it that was according to the Legislative enactment. The law says in reference to fences that a lawful fence shall be four feet and a half high, composed of substantial rails or boards—that the lower half of the cracks shall not be more than four inches wide. Now, you cannot build a fence of the kind first described and get the cracks that way. Supposing you have every rail exactly alike, when you come to cut off the shoulder to make the tenon there you have a large crack up against the post. Our law is such in Ontario that any municipal council may pass a by-law compelling the owners of cattle, horses, sheep, turkeys and geese to confine them on their own land, and if found running on the highway they are pound-able; any person can take them up and pound them. We have had that law in East Whitby for years, and I am happy to say we are not half as particular now in making our outside fences as we used to be. I know a man who has 150 or 200 acres of land, and there is not a fence along the road that will keep cattle out. I was pleased last fall when I was in York State to see no fences as I passed along. There were the most beautiful lawns and flowers without a fence or a rail to protect them. I am in favour of that, although I have criticized the report as I have. We have a law now enabling us to have that here too.

Mr. Beadle.—Once on a time I ran for Reeve of the Municipality of Grantham. At that time I was living in that municipality. I had not been absorbed into the city of St. Catharines then. I should state that I had been Reeve the year before, and I had advocated very strongly the passage of a by-law such as our friend has just now spoken of—that every man should take care of his own pigs, and sheep, and cattle, and geese, and so on. My opponent in the election of the next year raised the cry that I was opposed to the poor man. There was a certain *poor man* always around somewhere who had a cow, or a sheep, or a small flock of geese or ducks, or a dozen turkeys, and I was not willing that that poor man should have anything for his pigs, or sheep, or cows, or turkeys to eat; and the result of the election was that I was beaten.

Col. McGill.—That same cry was used in the township I live in for years; and the gentleman who had the by-law passed had his cows out the next year.

Mr. H. O. Smith.—I have a fence on my place that has stood there for forty years, and it is a good fence yet and has never been repaired. It is a rail fence, composed of pine and ash rails. I have no doubt it will stand for fifty years.

Mr. Dempsey.—I have seen rails that were over ninety years old in my own section of the country. They had been split from butternut. They were undoubtedly very large rails when they were first made; but they are gradually growing less every year through the rain wearing them away. Then I have seen butternut cut not more than ten years that have failed since.

FRUIT PACKAGES.

Mr. Dempsey, on a report being called for from the Committee of Fruit Packages, said that the Committee had not prepared any report. He proceeded: The Committee met several times; but one or two of the members thought it better to allow every man to swindle all he pleased. The result of every effort to arrive at any conclusion has consequently been a failure. We took the trouble to examine into the law to see what there was regulating the size of the apple barrel; and there is no such thing that we could find. I believe there is a law in Canada fixing the size of *a barrel* at 31½ gallons, imperial measure; but custom has often disobeyed this law. With respect to packages for small fruits and peaches we could not come to any conclusion. Two of us, however, were of opinion that three half-pints would be sufficient for a strawberry basket—as

large as it could be used for shipping purposes. When we came to peach baskets we were of the opinion that twelve quart baskets were preferable to baskets holding half a bushel, from the fact that the fruit would carry safer in them, and enable the peach-grower to place his peaches in the market in an honest shape. In fact, he could have control of his baskets, and nobody could accuse him of dishonesty, because it would not be understood that there was half a bushel in the package. We could not agree on any conclusion; and we decided not to make any report unless this meeting wished it. One member of the Committee opposed everything that the other two of us proposed.

Mr. Pettit.—I am in favour of our shipping the fruit in such packages as will bring us the most money. If we were required by law to ship any certain sized packages we could not ship sometimes in as good shape as would be desirable. In the case of the early peaches, for instance, you will get as much for the small packages as you would for the larger ones. It is to the interest of the grower, I think, to preserve his freedom in this matter as far as he can. Of course it is different with the consumer.

Mr. Dempsey.—It occurs to me that, supposing there was some authorized size for the peach basket, a man might honestly ship half baskets as half baskets, because if there is a law that regulates the size of a bushel of potatoes it does not follow that a man must always have a bushel in every quantity he sells.

Mr. Bucke.—It appears to me that this age of civilization requires universal measures; and I do not see why the fruit business should not have a standard measure just as well as anything else. If a person sells a small gallon for an imperial gallon he is hauled up now-a-days. I do not see why there should not be a standard for fruit as well as a wine measure or a dry measure.

Mr. Drury.—It just depends on whose interest you are looking at. If you are looking at the interest of the grower you had better leave it so that he can make a little deduction—not large enough, perhaps, to attract attention, but large enough to do a service to him. But if there is to be justice and fair play all round, then I say there should be a standard.

Mr. Gott.—I maintain that it is an injury to the grower not to have a standard. It occurs something like this: An honest grower takes a half bushel, say of peaches, and charges so much for them. "Oh, but," says the buyer, "we get them in Toronto for so much a bushel; they are half bushels." "Well, are you sure they are half bushels?" "Oh, yes, they are half bushels." At the same time they are not half bushels. In this way the home-grower is injured. Therefore I think it is important that we should have a standard. I would say it is not only in the interest of the fruit growers, but also in the interest of the public. We should have something, especially in the case of strawberries and raspberries, and in the case of peaches. As for grapes, they are sold by the pound, and we know just exactly what we are getting.

Mr. Biggar.—There are two sorts of baskets introduced for peaches, twelve-quart baskets and fourteen-quart baskets; and I have known men with fourteen-quart baskets selling them at the same price as those with the twelve-quart baskets. Now, when this has been done somebody has got a bargain, or somebody has got cheated. If we used only fourteen-quart baskets we could put a half-bushel in them without crushing them, and the fruit would come to the consumer in a good condition. I would be in favour of selling peaches by weight—making so many pounds a bushel, and making the baskets accordingly—making three sizes of baskets.

A Member.—Couldn't that apply to all fruits?

Mr. Biggar.—Yes, to berries and other small fruits. I shipped some peaches last year in the large baskets in order that they should go in good condition. I sent them to Collingwood, and explained that the baskets held fourteen quarts. Still they did not give satisfaction. I put more peaches in than I put in the twelve-quart baskets; but they were not heaped up. They were in good condition; but they were not satisfactory, and I had to go back to the twelve-quart baskets.

Mr. Beadle.—I quite agree with Mr. Drury's view of the matter I think that what is fair for one would be fair for the other. If the grower of fruit wants to be honest and treat his customer honestly he ought to be willing to sell a bushel for a bushel, and not sell fourteen quarts for a half bushel. A law was introduced, if I remember rightly,

a few years ago that we were to sell root crops by weight; but I do not think that it is done. I know we go into our market and ask for potatoes, and they are so much per bag. The seller never talks about weight. I presume large cargoes are sold by weight. Then if we were to weigh strawberries and raspberries I suppose we should be troubled by getting into ounces and fractions of ounces, perhaps. But if a fruit grower uses a twelve-quart basket when he should use a sixteen-quart basket, I hold he is doing wrong.

Mr. Orr.—I would not be in favour of selling peaches by weight. If they were sold in that way we should be looking for peaches with large pits. But I think we might easily arrange it to have a standard basket of fourteen or sixteen quarts, and have baskets of three or four different sizes based on that—whole basket, half basket, and quarter basket. By sending the fruit in large boxes a grower can sometimes make as much out of them by shipping them in large lots as by shipping them in small.

Mr. Drury.—I think the proper thing would be to have a law enacted to this effect: That there should be so many cubic inches in what we call a basket of peaches, and then that a basket of that size and, for convenience, baskets which were fractions of it should be made standard measures. If that were done it would meet the whole case; while it would be no injustice to the grower, I believe it would be ample protection to the buyer.

Mr. Wolverton.—I think there should be a standard size of basket; but the question is what the size should be. We ship a great deal from about Grimsby, and the size we generally use is the twelve-quart basket—not from any intention to deceive the buyer, but because that is the most convenient size in which to ship soft fruit. One way, of course, to avoid any difficulty is to state in shipping what the basket contains. That is what we do.

Mr. Beadle.—I do not think there could be any exception taken to the use of baskets of various sizes as long as it was understood between the buyer and seller whether any basket being purchased was a twelve-quart, a fourteen-quart, or a sixteen-quart basket. But the difficulty comes in just here: I buy a basket of peaches, and it may be twelve, fourteen, or sixteen quarts; and the purchaser sometimes thinks he is getting one when he is getting another.

Mr. Gott.—We get the reports of the New York markets almost every day, and peaches are quoted at so much a basket, and we do not know how much that is.

Mr. Dempsey.—I hope nobody will think there is any imputation intended against any person who may use the small basket; this is simply a discussion. I was in Montreal last year looking at the fruits in the market there; and I found I was using a berry basket the same that most of the others were using—one that held a little more than three half pints. By rounding the berries very high you could put a quart in them. You would see some lots of strawberries there in which the baskets of the top tier in the case were heaped up, and the under ones very poorly filled. Those fruits were soon found out, and they then went for from one to two cents less than the berries of the honest shipper. Then I found that some did not fill the baskets of the top tier any higher than those of the lower ones; and there were some persons that shipped into that market that got, during the whole season, about two cents a quart more than the quotations. So that I am satisfied it pays the producer to use such a basket and fill it in such a way that he can go into the market and conscientiously say "there is so much in it." I have been in the market with my strawberries, however, when I knew the basket did not contain a quart; and when the people asked me "Is there a quart in it?" I would tell them "Oh, no, not at all." Then another man standing a little way off would be asked "Is there a quart in your basket?" and he would say "Oh, yes;" and he would sell his berries before I could sell mine simply because he would lie about what the baskets contained. Strawberry packages should be twice the size of raspberry packages in order to ship the fruit successfully.

Mr. Wolverton.—I would like to ask our American friends if they have a standard peach basket, and, if so, what the size of it is.

Mr. Woodward.—The size of our basket is just exactly the size of a lump of chalk. Every man goes as he pleases. We have thought over this, and had committees on it, and had legislation; and yet the thing remains just where it started. I find they are

having the same trouble in Michigan. I think there are only two practical solutions to this question. One is to sell everything by weight. That is a thoroughly practical solution. Another is to brand every basket with its size, and let a man sell any size he pleases. Half the berries in the market of New York are in third pint packages; and men who grow extra nice berries put them in even smaller baskets than that. They call them third pints, or half pints, or quarter pints; whatever they are you will see them quoted at that.

Mr. Dempsey.—I would be satisfied if the Legislature would compel the seller to mark the basket with just what it contains.

Mr. Drury.—That would just meet the difficulty. I know it is a cause of complaint all though this northern country that there is a variation in the size of the peach baskets; and we find we are not getting what we expect.

Mr. Pettit.—If the packages were marked—take those for peaches, for instance—if you shipped a twelve-quart basket of peaches, and they got pretty soft before they got to their destination, so that they would not measure the twelve-quarts then, should they be confiscated on that account? Are you to guarantee they are twelve-quart baskets or not?

A Member.—Guarantee the twelve-quart basket.

Mr. Biggar.—In shipping a basket of peaches from here to Quebec, if the peaches are not very hard they will sink an inch and a half on the passage. The only way to sell peaches or anything of that kind that shrinks is to sell by weight. I have known peaches to sink as much as two inches in going to Collingwood. It is utterly impossible to pack them so that they will not shrink.

Mr. Orr.—Berries picked in a damp day and then passing through a dry day would shrink perhaps more than one-tenth in weight, so that there would be the same objection to weighing.

Mr. Honsberger.—In my business I am using three different sizes of packages, a four-quart basket, a twelve-quart basket, and a sixteen-quart basket; and I ship the most of my fruit. Sometimes, however, I go to the St. Catherines market. I had one time both twelve-quart and sixteen-quart baskets for the sale of peaches, and, when a customer would come up and want a basket of peaches and I would say to him, "Here is a twelve-quart basket and here is a sixteen-quart basket, which will you have?" He would say, "Oh, I will take the twelve-quart basket, it is lighter; I can carry it easier." He was willing for that reason to take the twelve-quart basket at the same price as the sixteen.

A Member.—Was the price for each of them the same?

Mr. Honsberger.—The price for the twelve was exactly the same as for the sixteen.

A Member.—The same quality of fruit?

Mr. Honsberger.—Exactly the same.

Mr. Drury.—I move that Mr. Bucke be added to the Committee, and that the matter be referred back to the Committee, with instructions to reconsider the subject, and to report to this meeting if possible.

The motion was carried.

Mr. Beall was called on for the Report of the Committee on Roses, but said he had not had time to prepare it.

Mr. Beadle moved that the committee be continued, with a request that they hand in their report to the Publication Committee in time for the next annual report.

The motion was carried.

CELERY.

Mr. Taylor was asked to introduce a discussion as to the best method of cultivating celery and the best varieties of it. He said: I do not know that I can offer you much on the subject. Celery has been almost a failure in this neighbourhood of late. We tried to grow it, but the thrip has almost destroyed it. My idea is that it does not pay to grow it for the market. In cultivating it we manure it well. We bank it up the first time we

plough it. We do not sink trenches any more—merely plough it—we cultivate on the surface. The insect keeps eating off the outside leaves.

Mr. Gott.—Will the gentleman state what varieties he has had that experience with.

Mr. Taylor.—The small size grows solid and good. The pipe stuff is no good for the market at all. We cannot find out anything that will stop the insect.

Mr. Bucke.—There is a great deal of celery grown down at Ottawa. It grows naturally in low ground. It is a kind of swamp plant. At Ottawa they grow it in black muck, and they find that in deep black muck it grows best. I have seen splendid crops grown in that way without any manure at all. They find that it keeps better in the winter in the muck than in sand. It almost always rots if kept in sand in the winter time.

Mr. Woodward.—I grow enough celery to eat, and I am surprised that the American people use so little celery as they do in their families. Of all the vegetables I know of I do not know of anything, aside from the potato, that is more indispensable to a family's welfare and enjoyment as celery; and I do not know of anything that is more easily grown, provided you have a supply of water. I grow the celery for my family in my city lot. I have grown this year 70 rows 60 feet long. They have had all the celery they wanted to use from the time it was large enough, although it is on the table three times a day, and I have enough yet to last till April. There are two things requisite in growing celery. One is to have the ground rich, and the other is to have plenty of water. That which I want to use in the fall I hill; that which I want for winter use I do not hill, or only enough to keep it up and keep it close. I take those deep boxes such as men's rubbers come in; I set the box right on the end, take up the celery with all the dirt I can get adhering to it, put a little light loam across the end of the box, lay in the celery, fill in around the roots with the soil in which it grew, and spread some loam on top. Then I lay on top of that another tier of celery, and so on until I fill the box. I then carry the box into the cool part of the cellar, and, if I want to water it, I go and pour a pail on there, and it will absorb into the bottom of the box. I was looking at my celery the other day, and there is plenty of it grown up new in the box. I buy my plants at the gardener's. I have forgotten the name of the celery I have this year, but I like it better than any I ever had. It is a purple celery. It has more of the distinctive flavour of the celery than any of the green celeries I have ever grown. It does not look so well on the table as the green celeries, but in taste it is very much better. Mr. Storrs, of Michigan, has a way that seems to me fully as good as mine where it is available. That is, instead of filling in with loam, he uses packing moss such as the nurserymen use; and where that is obtainable I think it is preferable to the loam, and very possibly it would keep the celery just as fresh.

A Member.—Have you an insect?

Mr. Woodward.—In very dry weather we have a little trouble with the insect unless we have plenty of water. During the very dry weather this summer I set the water running on my celery plot, and it ran about three quarters of the way across. My little boy shut it off; I did not notice it; and in less than a week you could see the line that the water went to by the size of the celery. And the start it thus got it maintained until it was time to take it in in the fall.

Mr. Beadle.—With regard to variety of celery, the one that has pleased me best is the one that we know by the name of the Dwarf Sandringham. We do not want those large, coarse green kinds. It is some years since I have grown any of that kind of celery. It is undesirable for table use in comparison with the dwarf varieties. I have never tried Mr. Woodward's variety of purple celery, and perhaps he is correct in regard to it; but there is a sweet, nutty flavour about this Dwarf Sandingham celery that is very agreeable to me, and I believe to all persons who have used it. With regard to the cultivation of celery, I have known what Mr. Bucke said about it to be true. There is a part of my grounds that is a black, mucky spot, and water goes there in the spring, and fall sometimes. We have put the celery there of late years, finding it grows better there—I suppose from the very reason that there is more moisture there. This being a very dry season the celery stood still through the summer, and I saw the effect of insects on the leaf. I did not examine it enough to ascertain whether it was the thrip or not, although I thought it looked like the thrip's work; but after the autumn rains came on we had such an open fall

that the celery took a start and grew very finely ; and we had a very fine crop of celery after all. I have not been in the habit of keeping it as Mr. Woodward suggests. I have no trouble in gettting at it. I put it in trenches, and when I take it up I keep plenty of soil at the root, and stand it up in the trenches. Then I take a couple of boards and put them over the top, lay a little straw over the boards, and there it keeps ; and we go and open it on any mild day and get any quantity of celery we want, and take it into the cellar and store it. We have often found it to grow in these trenches. Stalks grow up from the very root, and by spring there will be quite a growth of it.

Mr. Woodward.—We used to store our celery just as Mr. Beadle says, and it is not half the work to put it in the boxes that it is to put it in the trenches. And you do not have to wait for a warm day ; it is there any time. When it is very cold where I have my celery stored I throw mats over the boxes.

Mr. Dempsey.—I have never tried the cultivation of celery very extensively, but genally try to grow nearly enough for my family's supply. We find no difficulty in growing it. We select a piece of land that is capable of standing any drought, make it rich, and we find that we can get very nice celery. We cultivate just as Mr. Woodward speaks of, and we have been in the habit of packing it in the cellar. That has not a cement bottom —just an earth floor. We fill in with the earth we dig out with it—any earth, in fact. This system of watering is a novelty to me ; but a neighbour of mine had very nice celery this winter, which we were admiring, and he said that he simply packed it in his cellar in the fall just as we did, but he would go in occasionally and throw water over the top of it. He kept it almost saturated with water all the winter through. I had always thought too much water would rot the tops, but in this case it was just the opposite.

Mr. Woodward.—If the temperature happens to get up warm it will rot the tops, but if you keep water at the bottom to keep it moist it will be all right.

Mr. Dempsey.—I have seen it packed in straw for the winter, set up as Mr. Woodward says—close together, and with straw around it.

Mr. Woodward.—When we commence on a box it is just full, and it is pretty hard work to get it started. At first when you pull it out it is just like pulling out weeds that grow out of doors, but after you have once got it broken you can keep taking it out. The variety mostly used by us is Boston Market.

Mr. Beall.—Those who have never grown celery in the black muck, and who have black muck in which they might do it, I would advise to try it, because celery is the most profitable vegetable you can grow if you have plenty of black muck. I can remember in our town, five or six years ago, when it was regularly sold at ten cents a root. For the last four or five years we can buy all we like, and it is generally eighteen or twenty inches long from the butt to the end of the leaf. It is grown in black muck. It is very easy to grow it. A lazy man can grow it. It sells now generally at from two to three cents a bunch.

Mr. Gott.—Is it planted on the surface or in trenches ?

Mr. Beall.—In trenches ; and there is no water. Even this last summer where we had about six weeks with scarcely any rain we noticed no difference—it grew right along in that particular sort of soil.

NEW VARIETIES OF POTATOES.

Mr. Bucke, in opening a discussion on the question " Which of the new varieties of potatoes give promise of being valuable?" said : The only new variety of potatoes I know anything about is Mr. Dempsey's. I sent some of them to Keewatin to a man who is earliest out there. He came in the other day and told me that out of the pound of seed he had got he had obtained a yield of 81 pounds. The potatoes were very large indeed. Three pounds was a small one, he said. I thought that was a very good yield.

Mr. Beadle.—Was it just one pound of seed ?

Mr. Bucke.—It was the pound sent out by the Association.

Mr. Dempsey.—That was to be under two pounds.

Mr. Bucke.—Mr. Dempsey's potato did very well with us. It is very nutty and nice in flavour. People who have raised it like it so well as a rule that they are not eating it; they are keeping it till next spring for seed.

Mr. Wellington.—Potato growing is hardly in our line, but last year we grew the Beauty of Hebron, and this year we have set out the White Elephant. That is a late potato, and I think it is a potato that has come to stay. It is very large and very productive. It is white; the eyes are not deep set; and on cooking it, it has turned out remarkably well, being very floury and without any sogginess in even the largest specimens. We had one specimen this year—and it was not a very good year for potatoes either—which weighed two pounds and a half.

Mr. Beall.—I had some of the Dempsey Seedling potatoes. I got a few more than the law allowed in the Fruit Growers' Association. I got them in another way. I had intended to have given them a very fair trial planted side by side with the Early Rose; for I cannot very well judge of the quality of a potato or of its productiveness but by comparison. I knew very well already what the Early Rose did for me. My land is not very well situated, I think, for potatoes, and when the dry weather came on the Early Rose soon failed—ripened early. The Dempsey potato continued green, but the rain kept off too long, and in due time the leaves gave way and died. I gathered the potatoes, and found a very fair crop. The Early Rose was not, I think, a third of a crop on account of the dry weather. If the Early Rose had produced in the same land as the Dempsey potato I should have said the Early Rose had given me a very fair crop. With regard to the qualities of the potato, I think I can sum them up very quickly. My Early Rose potatoes are sold. The Dempsey potato we are eating this winter. I think it will not be a favourite for some time—that is, until it is found out how to cook them. My wife tells me it is almost an impossibility to cook them; for you will either have them all broken open like flour or the heart not entirely cooked—they are so dry. We are much pleased with the potato, and for a long time I shall certainly not plant an Early Rose. The Dempsey potato will take its place. It is a better potato in flavour, and we like it in every particular. It resembles the Early Rose in shape, but it has a rougher skin It s a kidney potato. But the best feature about it is that the eyes are not sunken. It is the nearest to being smooth of any potato I ever saw. I never saw any other potato that I liked as well. I have had this year other potatoes that produced better, but they were in soil specially prepared. They were the Burbank Seedling.

Mr. Honsberger.—Although I cannot say that I am not a potato grower, I received from the Association the Dempsey Seedling, and gave it rather an indifferent trial. I was very much surprised at the results. I found it made a very rank growth. I am satisfied the land had no manure for at least five years, consequently the yield of potatoes was very light. I got for my crop about half a bushel, and from appearances they were very nice. I thought I shqld have just what I wanted in a potato—a medium sized one If I get an overgrown potato, I rather take it to the root-house for the cattle than store it for table use. This Dempsey Seedling is an almost perfectly smooth potato, and just about medium sized. Having so few of them I could not testify as to their quality; I want to give them another trial. I also tried the Burbank Seedling this year, and like it very much.

Mr. Woodward.—Varieties multiply rapidly, and about ninety-nine out of a hundred that are put out are hardly worth anything when you come to test them. It is very hard to find a potato that is better than the Early Rose, all things considered, although I do not consider the Early Rose a superior potato so far as quality is concerned. The Beauty of Hebron I call a very good potato. We have many potatoes that outyield it very much; but, all things considered, with us that is the best of all the new varieties I have tested. We have another potato, the Queen of the Valley, which is the heaviest yielder of any potato I have ever tried; but with me, this year, the quality is not up to what I expected.

Mr. Beadle.—What do your people think of the Early Ohio?

Mr. Woodward.—The Early Ohio is very similar to the Early Rose.

Mr. Dempsey.—Does it ever grow hollow?

Mr. Woodward.—Yes; if it grows very large it does. There is one thing about the

White Elephant that I think very highly of; that is, this year it has been less subject to the attack of the potato beetle than an other potato I have ever seen grow. That insect will eat up other varieties around it and never touch it.

Mr. Morris.—I have grown the Dempsey potato. I can only speak of it in comparison with the Beauty of Hebron, the St. Patrick, and the White Elephant. The Beauty of Hebron is a very nice potato, one of the best in quality, I think, I have ever known; but it is a very shy cropper. The St. Patrick would come next in cropping, and the Dempsey would about compare with that. It is a far better cropper than the Beauty of Hebron. But the White Elephant outdistances the whole of them in cropping. I grew the White Elephant on three different pieces of ground. One was an old fence row. There they grew pointed. One specimen of them weighed three pound six ounces. Some that grew on another piece of ground grew as nice a shape as could be.

Mr. Saunders.—I grew the Dempsey potato last year. I planted a row of them alongside the Early Rose, subject to the same treatment and in the same soil, and they yielded, I should judge, fully as much again in weight of crop, and the potatoes were a better size and smoother—better in every way. I found them very good indeed. I think that variety is a decided acquisition in the potato line. This last year was particularly unfavourable for growing potatoes with us.

Mr. Bucke.—I think we are not going to have any potato come to stay with us. It seems to me that, after a few years, every potato we get runs out. Any person who can remember the potatoes of thirty or forty years ago will know that they are all gone. We are always requiring new varieties; and for my part, I have given up all idea of having any standard potato. I think any person who brings out a new potato deserves the thanks of the country for so doing.

Mr. Woodward.—Don't you think the Early Rose is just as good now as it ever was?

Mr. Bucke.—Yes; I think it is. It has been in about ten years. I think in a few years it will disappear.

Mr. Beall.—A year ago when I was here I spoke of a peculiarity connected with my Beauty of Hebrons—that is, that they were scabby—and I could not assign any reason for it. This year I got a few nice clean potatoes, and I put them in these sample rows where I put the Dempsey potatoes and the Early Rose. They had the same cultivation, the same manure, and the same treatment in every way, and they came out more scabby than ever. There was nothing of the kind on either of the other potatoes. I forgot to state that the Dempseys I raised were nearly all of medium size. I had not one perhaps as large as the quarter of the part of the seed I got.

Mr. Bucke.—I think the scabbiness of the potatoes can easily be accounted for. There is only one true way to grow potatoes, and that is on sod. If they are grown on newly manured land they are sure to be scabby.

Mr. Dempsey.—This Dempsey potato that we have been speaking of is a seedling of my own. I showed in Hamilton—I think it was eight years ago last fall—two hundred varieties of new potatoes of my own production, and this is the only one that I thought worthy to continue in cultivation. It is a seedling of the Early Rose crossed with the Early Goodrich. The first year it was grown—I remember speaking of this before; and parties even questioned the truthfulness of my assertion—we obtained from seed the full-sized potato; but this variety was red throughout the inside as ever you saw a beet. We cultivated it the next year, and when we came to split the potatoes we saw that some of them were becoming whiter. We kept selecting the whiter potatoes, and it took us two or three years to establish the character it now possesses. I have compared it with several new varieties that I have had, and I have never found a variety that would beat it in yielding. I have never found a variety yet that will cook equal to it, and I feel perfectly satisfied still to stick to it. It was not sent out last year to make money; because it cost the parties nothing; and I have no object in making money out of it now. The potatoes are always a medium size; but the crop is abundant. They are always large enough for cooking purposes—I mean the large size. You scarcely find an overgrown one. They are ovate in form. The seed eyes are usually found only on one side of the potato, and very few in number. We had no trouble whatever in regard to

rotting or anything of that kind. We found the stalks grow very upright. It is an easy matter to hoe them—little danger of the whiffletrees of the horses or the edges of the teeth of your cultivator tearing them to pieces. We have tried the Beauty of Hebron—grown it beside other varieties; and certainly I think it is the best early potato I have tested. The Early Ohios do very well; but we find the most of them hollow. The Burbank Seedling I found to have the same defect as Col. Brooks' Ohio choke-cherry—"it wa' n't fit to eat."

REPORT OF COMMITTEE APPOINTED TO EXAMINE FRUITS ON EXHIBITION.

Mr. Saunders presented the Report of the Committee on Fruits on Exhibition:

Mr. S. Fowler, of Cambray, exhibits two varieties of seedling apples under numbers one and two. No. 1 is about medium in size, of a yellow colour, with a brownish pink cheek with greyish brown specks, calyx much depressed and slightly ribbed, stem short and slender in a rather shallow cavity. Flesh moderately fine in texture, nearly white, juicy, sub-acid with a pleasant aroma and fair flavour, would probably prove a good cooker. No. 2 resembles No. 1 in form and colour, but is larger, flesh scarcely so fine as No. 1; juicy, sub-acid, and would doubtless cook well. Both of these seedlings are a little over-ripe to admit of their being properly judged as to character.

Messrs. Geo. Leslie & Son exhibit samples of the Blue Pearmain, which is said by Mr. Leslie to ship much better than any other variety of apple known to him, uniformly reaching their destination in good condition.

Mr. O. F. Smith, of Glanford, shows a handsome bright red seedling apple, about the size and colour of the Jonathan; flesh rather coarse, sweetish sub-acid. As it is rather over-ripe, it is difficult to judge of its true merits.

Mr. A. M. Smith, of St. Catharines, has on exhibition good samples of Lawrence Pear, in an excellent state of preservation, with their full flavour and juicy mellow character well developed.

Mr. S. Woodley, of Hamilton, exhibits fine samples of the following varieties of pears, all in good condition: Easter Beurre, Josephine de Malines and Winter Nelis.

Mr. Alexander Cowan, of Hamilton, exhibits some handsome specimens of fruits from Riverside, Southern California—gathered during a recent visit there. Beautiful clusters of oranges on the stem, with leaves attached, comprising Mediterranean Sweet orange, and the Navel orange. He also shows two varieties of lemons. These fruits are from trees grown by a Canadian settler named Chaffey, who settled in this district four years ago. A very fine box of California raisins is also shown prepared from grapes grown in the same vicinity.

Four samples of very good wines are also shown by the same gentleman, consisting of Sherry, Port, Jasens wine made from Muscat grapes, the variety used for making raisins, also a wine known as Cucamonga wine; your Committee, think that the Sherry is the finest of the four wines exhibited.

Wm. Saunders,
S. D. Willard,
Alex. McD. Allan.

MELONS.

Mr. A. M. Smith, in speaking on the subject of melons and best methods of cultivation said: I do not grow but about three varieties at present. The only musk-melon I grow is one that I got the seed of from Washington, called the Hunter melon. It is a large, long, rough-skinned green-flesh melon of very fine quality, and I have grown it for several years. When I was located at Drummondville I supplied the principal hotels about

the Falls with it; and they told me it was the best melon we could get hold of. I grow that exclusively as a musk-melon. Of water-melons I grow principally now a variety that is called, I think, Haskell's Excelsior. It is a large-sized, mottled melon of very good quality. I tried this year a new one called the Cuban Queen. It is said to be of enormous size, though this last season it was so dry that it did not grow with me very large. I think the largest one I had weighed about 25 pounds. They claim to have raised it in the States to weigh 80 pounds. It is a red-flesh, very fine melon, and very thin-skinned. It would be a very fine melon for amateurs; but it is rather tender to handle for shipping. I have tried the Mountain Sweet, which is a very good melon. The Gypsy is a very large melon, but a little too late for this climate. I find the Excelsior is hardly equal to it in size; but it is earlier, and in quality fully as good. With regard to the method of cultivation, I generally make my land as rich as possible. I do not know that you can get it too rich for melons. The great secret in growing them is to keep them cultivated; if you hoe them every other day it is to their benefit.

Mr. Gott.—Do you manure the whole surface of the ground, or simply the hills where the roots are?

Mr. Smith.—I put the manure in the hill.

Mr. Bucke.—How early do you have them?

Mr. Smith.—Generally about the middle of August, sometimes a little earlier, and sometimes a little later. It depends upon the location.

Mr. Gott.—What distance do you plant apart, and do you practice pruning the vines?

Mr. Smith.—No; I never practice pruning to any extent. In the last hoeing, if some of the leaders are getting out a little too long, I sometimes crop them off with the hoe. I generally put them from seven to eight feet apart.

Mr. Bucke.—Do you allow them to fertilize naturally; or do you assist fertilization?

Mr. Smith.—Just naturally.

Mr. Beadle.—It is claimed by some that if you will pinch the running vine after it starts out and has got to be two or three feet in length, and compel it to branch, you will get fruit much earlier, it will set much earlier than if you allow it to run on until it sets its fruit. I thought perhaps Mr. Smith would throw some light upon that point.

Mr. Dempsey.—I have tried pruning in that way. We generally pinch the ends when they start to run, particularly in the musk-melons. Some growers pretend that it pays to pinch the vine before it starts to run, and that several branches will start from the same plant; but I think it pays better to let it run about twelve inches or something near that. Some will be eighteen and some six inches, because when we go there to pinch them we don't do it all at once. That induces laterals to start out from every joint. I have seen stems that were not pinched run six or eight feet before there would be a blossom that would produce fruit, and then if it was not pinched that fruit would fail. We do not prune them, only pinch the tip. All of the fruit would lie then near the roots. The hills we plant generally eight feet apart, which gives ample room to get around your hill; and it is none too much space either, from the fact that you will find if you examine the soil that these roots actually meet, and in fact more than meet—they cross each other. The whole of the soil will be occupied a little below the surface of the musk-melon land with the roots. Consequently it will be necessary to fertilize the whole of the land. I do not like too high manuring for melon culture. We simply use a handful of salt in the hole, and a little ashes. Gypsum is a very good thing, and we like it and some bone dust. We do not use much stable manure for our musk-melons. For water-melons we generally use superphosphate—just a handful of it. I would rather have a loose, sandy soil than a very rich loamy soil to grow water-melons. If you are going to be successful in growing water-melons you must select a very warm spot. If possible, select a piece of ground that is protected from the north and west. Cultivated on such soil I find no difficulty whatever in obtaining melons of large size and delicious flavour; and they ripen sufficiently early. I never saw a man cultivate his melons too much. It will pay to cultivate them every day, if it can be done—the soil between them. The musk-melon should never be cultivated deep, however, after they begin to vine, from the fact that the roots run very close to the surface, and they do not require any root-

pruning. For water-melons you can cultivate deeper; you will find the roots penetrate deeper into the soil. I have seen Long Island melons and Black Spanish melons on soil that would not grow a good crop of Indian corn, that would weigh more than thirty pounds. We have a piece of land that is a sand hill—actually a drifting sand, you may say—and I remember picking one melon on it, a couple of years ago, that was all I could carry to the house conveniently. I am satisfied it is not manure nor strong soil we want to produce good water-melons, but heat and cultivation.

Mr. Beadle.—Why so much cultivation?

Mr. Dempsey.—They are like all other crops that we cultivate on a warm soil. All warm soil is inclined to be a dry soil, and the oftener we stir it the opener we will keep it; and by that means the atmospheric air is enabled to penetrate the ground, and to maintain a certain amount of moisture without the amount of cold being admitted that there would be if we applied water to it. I ask for no better water-melon on my table than the Mountain Sweet; but I find there is more money in the Black Spanish than in any other variety I have tried. It will yield more weight than any other we have, and will ship better than any other melon. The skin is rather thick. We cannot barrel the Long Island safely for shipping. We find that a great many of them and of the Mountain Sweet have broken, so we usually ship the Black Spanish. The Hunter musk-melon is a large melon that is liable to grow crooked if you are not careful to turn it over, and one side will be thin; but it is a very fine-flavoured green-flesh melon. It is one of the finest melons to supply a hotel with that I have ever seen. It will produce a greater weight per acre than any other melon I have ever seen. We cultivate Skillman's fine netted melon also, a musk-melon. It is an early melon, very reliable; and you will generally find, if they are properly cultivated, that there are no bad ones among them. The Nutmegs we cultivate sometimes; but they are variable in their flavour.

Mr. A. M. Smith.—In regard to this sandy hill—don't you manure pretty liberally in order to get good water-melons out of it?

Mr. Dempsey.—No. We usually sow broadcast from a barrel to two barrels of common salt to the acre; and then we plough the soil. It is better to plough the soil three or four times before planting the seed—not be in too great a hurry in getting it in in the spring; let the soil get warm. Apart from the salt we apply a handful of the superphosphate of lime. If we have not that we use the bone dust and ashes. We grow a great deal better melons where we use the salt than where we do not. The salt helps to retain the moisture.

Mr. Beall.—Isn't your land new where you grow the melons?

Mr. Dempsey.—I was told by an old man who worked for me that right on that spot he recollected cutting wheat that yielded forty bushels to the acre more than forty years ago. It is soil that has never been in the hands of parties that had enterprize enough to draw a load of manure on it. When I moved on it, all the manure was lying at the barn. I presume it may have had a little manure dropped on it occasionally; but I do not think it had had a load of manure on it for forty years. It actually failed to produce rye and buckwheat.

Mr. Gott.—Could you give us any information as to the profitableness of this crop, and as to the amount to be produced?

Mr. Dempsey.—It is a very profitable crop if you have a market for it. We have sometimes produced such quantities of water-melons that the truth in regard to them would appear unreasonable. We had a couple of acres of them four years ago, and the yield that year was so great that we could drive a two-horse waggon into the patch and load it with water-melons, without stirring the waggon, one or two men outside passing them to a man in the waggon, and he laying them round. It was a two-ton load at that. The waggon box was made wide so that it would hold fifty bushels of potatoes, and we would round it up with melons without stirring the waggon.

Mr. Beadle.—How do you market them—by the ton?

Mr. Dempsey.—No; by the piece. Parties generally order a certain number of melons of about such a weight.

Mr. Orr.—How far do you have to take them before reaching cars or boat?

Mr. Dempsey.—Twelve or fifteen miles.

Mr. Beall.—I want to ask the President whether he sowed the seed in the ground where the melons grew, or put it in hot-beds?

Mr. Dempsey.—Invariably sowed it in the ground where they grew. Usually we begin to pick our melons about September, and no matter how early the season is, we never think of planting the seed until along in June. They begin to vine in about six weeks, and by forcing them on they grow very fast.

It being now six o'clock, the convention adjourned till half-past seven.

CORN FOR TABLE USE.

In speaking to the question, as to what are the best varieties of corn for table use,

Mr. Beadle said: I think the sweet corn is the best for table use. Then the question is, which sweet corn? I know that our yellow corn is a very good variety of corn. It continues a short season, and makes very fine, sweet meal; and it is passable eating when green. But our renowned sweet corn is altogether preferable. I find the variety known as the Minnesota sweet corn the earliest. I have tried a sweet corn raised in Vermont, which I find about as early. It is sometimes grown in the eastern counties of Quebec. It ripens about the same time as the Minnesota, and I cannot see any material difference between the two varieties in quality. Then we have Crosby's early sweet corn, which we like very well. I think it a little richer, a little sweeter than the Minnesota. Then there was an Egyptian sweet corn. I have grown that; but I do not like it. It is not sweet enough to suit me. It gets in late, which is perhaps an advantage. And yet, to me, that is no advantage; I can keep the other corn just as late, by planting it a little later. Then we had Stowell's Evergreen. It does not get hard, and it is, in that sense, an evergreen corn that remains fit for table use a considerable time. But I do not consider that of the highest quality. I can just as well have one of these other varieties of sweet corn that is richer by planting it later. I do not see anything gained by multiplicity of kinds. I believe, however, that for canning purposes, for winter use, these later varieties are preferable. Perhaps one reason is, that the ears are larger; you get more corn on the cob, and probably can do the work more rapidly. Stowell's Evergreen is so called, because it is in use for a long time; in fact, stays green until the frost appears.

Mr. Bucke.—A very large cob?

Mr. Beadle.—Yes. There is not much difference, to my taste, between that and the Egyptian.

Mr. Beall.—We grow corn. I was trying very hard, just now, to think of the kinds we grow; but there is one kind I cannot think of the name of. It has a long, yellow ear. However, we grow the early Minnesota and the Stowell's Evergreen; and this other one comes in between the two. We generally grow four kinds in the year. We generally take one other new kind; but we invariably come back to the three old ones, and the new one we generally pass aside. This year I had a couple of ears of Chief Johnson's corn, and I must say that, when it was exactly in the right season, it was exceedingly good. We liked it as well as any corn we ever had. But a great drawback to it was this, that after three or four days—perhaps not longer than a week—we had not any of it to eat; it was too dry. Another objection to it was, that it was certainly the most rampageous corn I ever saw—most immoral corn; for it impregnated almost every other corn I had. It discoloured their seeds.

Mr. Woodward.—We grow Minnesota for early. Although it is not very sweet, it is about the earliest I think we have. Then we grow Stowell's Evergreen; and then we have a corn that we call California Sweet Corn. It is much larger than the Stowell, and more prolific. It does not grow quite as early. I think the finest corn I have ever eaten, I ate last summer in New Jersey. It was a black sugar corn; I forget the name of it—rather darker than Chief Johnston's corn; it was quite black before it was cooked. When it was cooked it paled out a little. It is not as early as the Minnesota, but about

ext to it. E. Williams, Mount Clair, is the gentleman at whose place I ate it.

Mr. WILLARD.—I grow the same corns that Mr. Woodward does. I think a great deal of that large late corn, that he speaks of. I think a person would enjoy eating it better than any other corn, on account of its coming in later. You get a larger mouthful of it.

PEACHES FOR MARKET.

The next topic discussed was, "Best Varieties of Peaches for Market, ripening so as to give a continuous supply during the season."

Mr. GOTT.—The earliest peach that we have is the Alexander, Amsden's June, or Early Canada. We consider these three varieties to be identical, inasmuch as if you put the ripened fruit into a basket and shake it up, you cannot pick out the different kinds again. The trees too are very similar. I do not mean to say that they are identical, but they appear so to us. Another peach that we have is the Early Louise. It is on Mr. Rivers' peaches, from England. It is an excellent peach. The next profitable peach that we have, coming in after those, is Rivers' Early. It is a peach for the million. With us, it stands in the same relationship to peaches in general, as the Concord grape stands to the grape family. It is emphatically the peach. We consider it to be the standard of all other peaches. Crawford's Late is an excellent peach, possessed of many valuable qualities. It is large sized and of beautiful colour; the trees are hardy—fully as much so as the Early; and the fruit appears to be worth more—it is better adapted to our markets. The worst feature of Crawford's Early is, that it comes to the glut—usually at the time our seedling peaches are in the market. But a good peach will sell at any time, glut or no glut. There are several peaches coming in after these. The peach called Stump-the-World is one of them. It is possessed of a great deal of value. It is an excellent peach for exhibition purposes, coming in for our fall shows, when all the other peaches are done. The peach called Foster is, in every way, I think, a model peach. If there is any possibility of beating Crawford's Early that does it. Another peach which we have grown, but of whose qualities we could not say very much, is the Lemon Cling. It is a very yellow peach. It has a very fine colour—looks well; but it is almost an impossibility to get it off the stone.

Mr. PETTIT.—There are several important varieties that Mr. Gott has left out. I would plant first the Alexander. It is a very fine peach, and comes into bearing young. After that, the Early Rivers. It is not a peach that will stand shipping very well; but it is a fine peach, and sells well. After that, the Hale's Early. It is not much of a peach, and it has had a good deal of abuse; but it bears such quantities, and so regularly, that I think it will produce as much money as any other peach. After that, the Crawford's Early. That, I think, in our section, we have run too heavily on. It comes in with so much other fruit, and with so many other varieties of peaches, that it sells pretty low sometimes; altogether, it is such an excellent peach that no other variety would stand the quantity in the market that it would. After that, the Old Mixon, a fine peach, which always commands a good place, and is a good shipper. Then the Lemon Cling. It is an excellent shipper and very heavy bearer. After that, the Smock, an excellent bearer and one that comes in after the glut is over, and always commands a good price. Then comes the Salway. It is a little later; but it is a good peach.

Mr. MORRIS.—The Mountain Rose is left out. It would follow the Hale's Early, and then after that comes the Early York. I think those are as good as any.

Mr. BIGGAR.—Our friends have omitted a very excellent peach, the Morris' White. People are getting to know it now. I remember, a few years ago, it was hardly saleable in the market. Now there is a great deal of call for it, and you can hardly supply the demand for that variety. I would not be without it.

Mr. HONSBERGER.—My experience is not very extensive in peach growing. The Early Canada, the Alexander, and the Amsden's June are the earliest I grow. It would be like a grasp in the dark for me to choose between them. After them I grow the Early Rivers; after that comes the Early Beatrice, although a great deal is said against it. I find it in my orchard a little under-sized. It is a peach that is highly coloured,

and is a longer time in ripening than most peaches. The Early Rivers is a very nice peach; but I do not find it as profitable for a distant market as for a local market. For a local market there is nothing to excel it at that time. With me the Early Louise follows. It is a very nice peach; but I do not find it very profitable. Then comes in the Crawford. I have no Hale's, because they do not succeed with me. I find the Foster takes a few days the start of the Crawfords with me. The Crawford follows it. Then would come in the Mountain Rose and the Sweetwater. Those two are my favourite peaches for canning, above all the peaches that I have grown yet. Then would follow the Barnard, which is a very profitable peach if not allowed to bear too heavily. They want a great deal of thinning. It is just a medium-sized peach. It is very handsome. I think a great deal of it in the orchard. Then I have the Late Crawford, which I think a great deal of. The Old Mixon paid me better this season than any tree I had. Morris' White I find a little too small to be profitable. The Lemon Cling is a peach that a great many find a great deal of fault with; but for my part I would not want to be without some of them. They are a peach that come in in a good time, and I have found them to sell for a higher price for the last three years than Crawford's Early. Then I have the Smock, which I like very much. It comes in at a time when it has very little opposition, and generally fetches good prices. The latest I have is the Salway; but I would not want to plant very extensively of it, as it is a little too late to risk.

A Member.—Have you found the Salway ripen with you as well the last year or two?

Mr. Honsberger.—It has ripened thoroughly the last three years with me.

A Member.—What do you think of the quality of it?

Mr. Honsberger.—It is very good when thoroughly ripe.

Mr. Biggar.—Does anyone know anything about the Boisole's Late? It is a very good peach and a hardy one.

Mr. Gott.—The Early Barnard is one of our best peaches, very profitable and every way acceptable. There was another peach that was sent out some time ago by Mr. Barnard, called Early Melocoton, which is a good one. There is another peach grown up our way, called the Black Peach. The flesh is a dark pink colour, as though the whole thing from centre to circumference were stained with blood.

Judge Macpherson.—We grow a few peaches at Owen Sound. I had one last year, I know. There have been some very good ones grown there. The Early Crawford grows very well. But it is not a peach-growing country there, nor has much attention been paid to peach-growing in that section yet. Some places along the shore they grow them every year, and succeed very well.

Mr. Saunders.—I did not get even one peach last year from my place. The winter was too hard on the trees.

Mr. Willard.—I have been interested in listening to the ideas brought out with regard to the qualities of the peaches that have been mentioned. I have grown peaches somewhat myself; but I have found that the early peaches and the late peaches have paid me best. I do not think I have had any that have paid me as well as the Amsden. I can see no perceptable difference, however, between the Amsden, the Alexander, the Wilder, and the Waterloo. I think there is a little difference in the period of ripening in some of these varieties that are so closely connected together; but I think that difference, and perhaps the difference in the quality, is attributable some to the soil on which they are grown and the age of the trees. Mr. Barry, whom we regard as an authority on almost all of our fruits, has claimed that the Waterloo was earlier than almost any of these early peaches by a week at least. Now, I found the Waterloo on my ground this year to ripen with the latest of the Amsdens. I shipped the Amsdens for about ten days, and I found the Waterloo and the Wilder came in with the latest of these Amsdens. I have found the Rivers to be with us a very valuable peach. It has been one of the best that I have grown, but not entirely fit for long shipments because of its very tender flesh. It is the best, I think, of those peaches that Mr. Rivers has sent out. Speaking of it with regard to quality, you will invariably find the Rivers best on the south side of the tree. Perhaps that may be accounted for in a measure by the very marked character of the foliage, which is sometimes almost like that of a Lombardy poplar. In consequence

the fruit is shaded a good deal. I have fruited the Hale's July. It is a peach that stood the severity of the winter of 1875, when almost all the peach orchards on the shores of Lake Michigan were destroyed. It is a very fine yellow-meated peach. My wife thinks there is nothing like it for canning. But it has its imperfections. It is a tree that will over-bear ; and it must be thinned thoroughly. This year, in order to have good fruit, I had my man thin it three times. It may bear every year, and bear profusely ; but in order to get good specimens of fruit you must thin it thoroughly. While the Crawfords sold in our market for two dollars a bushel this year, the Hale's July sold for three, on account of its quality and on account of the glut being off the market. After that we found the Smock just what we wanted ; and after that the Salway. There have been a great many objections raised to the Salway, and perhaps justly. Mr. Elwanger said, in one of our meetings, that he had failed to ripen it at Rochester ; but it has ripened now for three seasons, and has been sent to Philadelphia and Boston and sold for four dollars a bushel. Its keeping qualities are wonderful, and in favourite localities where you are sure of ripening it well, I believe it is an acquisition.

Mr. Woodward.—There is one thing I would like to see—that is, a man who can tell the difference between a basket of Amsdens, one of Alexanders, one of Early Canada, and one of Waterloo peaches ; and I would like to see another man who can tell the difference between Early Crawfords, Foster, or Allen's peach. I think that of all the early peaches there was nothing that, with judicious care, we used to get so much money out of, when we were in the business, as we did out of the Early Beatrice. It is the handsomest of all the early shippers. It is as good a keeper as any of the early shippers. There is but one objection you can raise against it, and that is as to its size ; but if you thin out your trees you can get it up in such shape that it will sell with any of the peaches. There is another peach that I used to grow a little, that is, Hand's Early Golden. It comes a little later than the Crawford. It is a better peach than the Crawford—a better grower —not as good a bearer, but a very good peach. The Salway, where you can ripen it, is one of the finest peaches you can have, and it is a good keeper. I have seen them repeatedly kept until along in December. Wherever it will ripen it is a peach that is profitable.

Mr. A. M. Smith.—I would like to endorse what Mr. Woodward said in regard to the Early Beatrice. We have some three or four young trees of it ; and as a shipper I consider it ahead of the Rivers, though the size is against it. If, however, it is properly thinned out it is a profitable peach, and it is sure to bear every year. In regard to the difference between the Foster, Early Crawford, and Allen peaches, I would not say that I could tell the difference between the Foster and the Early Crawford ; but if the Allen peach that Mr. Woodward refers to is the one that I have in my mind, it is as distinct from the Crawford as the Spitzenburg apple is from the Baldwin. In the first place, the Allen peach is a week later than the Crawford ; it is a rounder peach, and has a great deal deeper colour.

Mr. Willard.—The Wager is a fine canning peach. It comes in between the Crawfords. It is exciting a good deal of interest among peach growers in our section at the present time.

Mr. A. M. Smith.—Some parties consider this Wager and the Allen identical peaches.

Mr. Woodward.—The Mountain Rose, for a not too distant market, is a very profitable peach. It is the only one of the white peaches, not too early, I would advise any man to plant. I consider it the best of all the peaches to can.

Mr. Gott.—The Mountain Rose is with us one of the best peaches that we have, and one of the most profitable. We can almost universally sell them for as good a price as we can the yellow flesh ones. With us the Amsden's June is picked first of the three mentioned by Mr. Woodward.

Mr. Beadle.—I would like to ask Mr. Willard if he knows anything of Reeve's Favourite ?

Mr. Willard.—I only know of it from what I have seen in Delaware. I saw it fruit in Delaware some few years since, and the impression I formed of it was very favourable indeed.

Mr. Beadle.—I have an idea that it ripens about the time of the Wager peach. It is a yellow-fleshed peach of a very good quality, a good bearer, good size and appearance. I have not fruited it myself.

Mr. Morris.—There are a good many of that variety fruited in our section, and I think the fruit is the largest that we have. It ripens a little before the Late Crawfords.

Mr. Beadle.—What do you think of the quality of the peaches?

Mr. Morris.—Very good.

Mr. Willard.—We have none of the yellows where I live; but knowing that they have them in almost every section, it seems to me that those engaged in the work of arresting the progress of the disease should ferret out and let it be generally known what peaches are less liable to the yellows than others. There must be some such grown at the present time.

Mr. Beadle.—I think that last winter Mr. Woodward told us that in his peach orchard—which was worth a good deal once, but is worth hardly anything now—there was one variety that escaped the disease.

Mr. Woodward.—That is so. This last year that same variety remained free from the yellows. I would not like to say it is exempt until I have tested it further. I do not know what the name of it is. It is a better peach than the Crawford. It is a round, dark peach, a deep yellow, and a larger peach than the Crawford, a good, strong grower.

PEACHES FOR CANNING AND DRYING.

Mr. Gott.—It has already been said that the Mountain Rose has excellent qualities for canning. We have a peach—I do not know whether it is very generally known—which we call Hall's Beauty. It is a very solid peach, not very large, but for canning purposes it is first-class. For drying, we consider that our seedlings answer every purpose.

Mr. Beadle.—I came away from the Rochester meeting with this impression on my mind—that the white-fleshed peaches have been used of late years by those who dry and those who can peaches because of their handsome appearance when put up—because they are more attractive to buyers than the yellow peaches. It is not that they possess any particular qualities that make them dry any easier or better, or because they can better, or are any richer. With regard to the seedling peaches, I do not know to what market my friend sends those he dries; but I think that no person who has an educated taste with regard to peaches would ever buy his Seedling peaches dried if he could get these other varieties.

Mr. Woodward.—We had one dryer in our town who told me not long ago that he would take all the Mountain Rose peaches he could get, and agree to run his evaporator night and day throughout the season, and would pay seventy-five cents a bushel for them. He said he thought he could not begin to supply the demand for them, and that the people would not take anything but that variety. He said there was twice the money in them that there was in any other variety that he had ever dried.

EFFECTS OF THE PAST WINTER ON FRUIT TREES, ETC.

The next topic discussed was, "The effect of last winter on fruit trees, grape vines, and small fruits."

Mr. Bucke.—I can bear testimony that last winter was the best winter we ever had for fruit trees. We had more blue plums this year than we ever had before; and we did not loose any fruits at all from the effects of the severity of the winter. Up here the winter was so severe that they thought we in Ottawa were all going to be killed out; but we never before had so much fruit as we have had this year. We had more

and better plums than we ever had before. I do not think we had it lower than 35° below zero last year.

Mr. SAUNDERS.—We were not so fortunate in the London district. My registering thermometer registered 26° below zero. The mercury got to the end of the tube, and I do not know how much farther it would have gone—I presume down to 32° or 33°. The result was that it killed nearly all the plum trees in our section dead, or so nearly dead that a few of them have struggled along here and there, making a very insignificant growth, and died towards the end of the year—those that did not die in the winter. I have not noticed any of the wild plums in the woods killed ; but I think all the cultivated varieties suffered, except in the city, where the trees were protected by houses. We found some of our ornamental trees killed outright also. When the thermometer has not been so low as that, we have usually lost some of our peach trees ; but last year the peach trees survived where the plum trees were killed standing alongside of them. The same might be said about some other varieties of fruit that are usually considered tender. In grapes, for instance, although my friend Arnold's grapes have usually been hardy, yet in one location on my grounds they were killed outright. The same varieties within a hundred yards, not so much exposed, survived, and made a good growth this year. Some of the cherries were very much injured. I lost several trees. They seemed to make a little start in the spring, and then died out. But it did not affect the cherries in the same disastrous way as the plums. Most of them survived.

Mr. WILLARD.—Had the plum trees to which you refer generally half a crop the previous season?

Mr. SAUNDERS.—The previous season these trees of mine had a very light crop on. This would have been the fifth year if they had survived.

Mr. WOODWARD.—Did not your plum trees, a year ago this last summer, lose their leaves in that drought, and did not they start out with their leaves when the warm weather came in the fall?

Mr. SAUNDERS.—They lost their leaves quite early in the season, but their buds did not start out again to any extent in the fall.

Mr. WILLARD.—I think the losing of their leaves then weakened the trees, and that then the severe weather last winter worked the disastrous effect on them.

Mr. WOODWARD.—I believe it was not last winter, but the severe weather a year ago last November that killed Mr. Saunders' trees. The sap was in the trees, and the frost caught them and killed them with ease. I was up in Ohio last fall, the first of December, and I saw grape vines there at the winter meeting by the armful, and you might examine them and not find a live bud in a thousand—they were killed. We had it down to zero in December, and they had it down there to five, six, and ten below zero. I never saw such extreme cold in November as we had then. It did not affect the peach, because the peach was done ripening ; it was in entire rest in November when the frost came.

Mr. BEADLE.—I think Mr. Bucke's trees are natives, are they not?

Mr. BUCKE.—The only really cultivated plum tree I have is the Orange Gage.

Judge MACPHERSON.—As far as Owen Sound is concerned, we had a frost in June that killed a greater portion of the outdoor grapes and plums. I do not think the November frost affected us. My recollection is that we had snow on the front then, and that it continued through the whole winter. We had very severe weather in the winter, sometimes 35 and 36, I think, and a great deal of snow, but I do not think the trees were injured by the winter at all. Mr. Roy was so singularly fortunate that all his grapes did well this year. Mr. Holmes, who lives on the other side of the bay from Mr. Roy, some little distance from the water, had as fine a crop of plums as you will ordinarily see. There were a few other places where they were successful in raising plums, but the greater portion of the plums and grapes were killed by that frost, and in fact all other trees, even the Canada thistles were cut down by it, but I do not think the severe winter affected them at all. Probably the reason for the difference is that in this part of the country there is not so much snow as at Ottawa or Owen Sound, or it may be that owing to having warm weather here the trees had commenced to bud out again.

Mr. ARNOLD.—I feel somewhat inclined to endorse the theory of Mr. Woodward as to the November frost. I think the cold came upon us so suddenly that the trees were

not prepared for it. My plum trees were killed—three-fourths of them—both in the nursery and in the orchard ; and it was not because they had a very heavy crop the year before. As for the grapes, they bore a slight crop. They were never worse covered than they were last winter ; and I was not looking for any. All my cherries that are worked on the Mazzard stock were killed; and I do not know of a single instance where they were grafted on the Mahaleb stock that they were killed, and they were growing side by side. My theory of the peaches being killed is that, in the Indian summer we have, the buds, after the foliage has been off some time, become swollen by the warm weather, and are thus destroyed. A warm fall is almost sure to kill the peach buds with me.

Mr. Gott.—Last winter was considered the most disastrous winter that we have come through for a number of years. In some places it affected the apple trees, though just in our immediate neighbourhood we have had one of the finest crops we have had for several years. Our plums were considerably affected—some varieties especially. The cherries were killed outright, especially those belonging to the Heart varieties. In grapes it pointed out to us those varieties that would kill down by frost. The Rebecca was killed to the gound, as was also the Isabella. The Eumelan was killed also very badly. The Rogers' No. 3 was killed entirely down to the ground. The Adirondac was killed so that it scarcely recovered any foliage from the old wood. The Salem was very badly killed so that it bore no fruit. The Iona was injured to a certain extent so that the fruit amounted to very little. Around the town of Strathroy the peaches were killed outright. We lost no peach wood ; but we lost all our fruits. The Balsam buds were killed by the winter's cold.

Mr. Beall.—I can scarcely think that the cold through the winter, although it was such a severe winter, did the injury that has been attributed to it, because with us it is supposed to be a cold climate, and I have not heard of a solitary thing having been killed in the neighbourhood—not even shrubs. I find that the lowest temperature we had was about 28 below zero ; and that was on the second of February. Now, it is possible that Mr. Woodward's theory is correct, and if it is I can account for the effects being wanting at Ottawa as Mr. Bucke says they were. It is quite possible that Mr. Woodward's theory is correct ; because the cold wave that we had at that time in November—that is from the 16th to the 26th—was to the south of us principally. At Erie, in Pennsylvania, the thermometer went down eight or nine degrees lower than at Toronto. The intense cold was to the south of us, I find that with us the thermometer registered nearly ten degrees below zero on the 24th of November, and still nothing was injured. I think the solution of the question can only be found in a better knowledge of meteorology, and that the Fruit Growers' Association should take means to get more knowledge on that subject. I think it would be to the interest of the fruit growers if comparative statements were obtained and published every year from certain given localities relative to the weather. It would assist in giving us knowledge which we do not possess now, and can not possibly possess.

Mr. Woodward.—The first frost that we had at Lockport, I remember distinctly, was on the 6th day of November. I remember taking grapes off the vine that day plump and nice, and up to the time we had that severe weather there had not been frost enough to drop the leaves from the trees, while at Ottawa, and at Mr. Beall's place, I have no doubt it would be different entirely, and the same temperature would not kill there that killed with us. I remember being in a plum orchard on the 9th day of December, and a gentleman was showing me his plum trees. It was at Adrian, Michigan. I took out my knife and cut a tree, and said to him, "your trees are killed." They had dropped their leaves, and then when the warm wet weather had come on they had started out, and many of the trees had young leaves on them as large as a mouse's ears, and they were frozen up in that succulent state.

Mr. Dempsey.—Although the winter was very severe with us we suffered very little. The frost in November came upon us so early that we had only got our trees properly covered over. The first frost was the first one that killed anything. ' There were only a couple of varieties of apples that I noticed to be affected at all by the cold winter, and strange to tell you they were Russian varieties. Our plums stood the severity of the winter very well, and blossomed in the spring, but we had no fruit ; of course the frost

in November happened to strike our grapes at that time before we got them laid down. We dare not attempt to winter them on trellises. Our grapes must be laid down every fall, consequently we suffered severely with our grapes. Some varieties, however, did not get killed. We would find that one variety in a certain locality had suffered scarcely any, while the same variety was frozen to death forty rods away. Among my own seedlings I noticed that in one place the Burnet was frozen dead, and my number 25 produced, although it was not laid down during the winter; and in another place it was just the reverse. We never had our small fruits winter so well. The most tender varieties of raspberries came through the winter perfectly, and we did not lay them down. However, I believe you had a more severe winter here than we had farther east. We did not have that June frost on our own place, but within a mile of us they suffered severely. Our places are both protected, one by elevation, and the other by being beside water.

MOST PROFITABLE PEARS.

On the question of which are the most profitable varieties of pears for market,

Mr. A. M. Smith, said:—I think the most profitable variety for our section is the Bartlett.

Mr. Beadle.—I would like to draw out an answer to this question:—Do any of the pear trees pay? It is really getting to be a question whether they do or not when we look at the destruction which the pear blight has occasioned to our pear orchards. I have been talking to some pear tree planters in our vicinity, and they are about giving it up in despair. They say they do no more than get their orchard in nice paying condition than the blight comes and kills the trees, One gentleman told me he was replacing his pear trees, as fast as the blight killed them, with plums. If this is the experience of pear tree growers generally we have to wait perhaps until we get trees that are blight-proof, or nearly so, before we can make pear orchards profitable. I remember talking to a Mr. Townsend in Lockport a good many years ago, and telling him that I had come to his place on purpose to see his pear orchard. "Well," said he, "you cannot see it. I can show you where the pear orchard was, but it is not there now. The blight has been there and killed nine-tenths of the trees, and a great many of the dead trees are still there." "Well," said I, "what do you think about it?" "Oh," said he, "I think it has paid me very well for the investment;"—whether he ever planted another pear orchard and ran the risk of the pear blight I do not know.

Mr. Gott.—The first pear, in my opinion, is the Bartlett. It always commands a good price. The next one that we find very profitable as a market pear is the Flemish Beauty. It is very popular. Another pear that we have that is very profitable and sells well in the market is the Louise Bonne De Jersey. Another pear that we are testing, and that we consider to have valuable qualities, is a combination of the two first I have named, called the Clapp's Favourite. It is a very fine pear to look at, and will sell very well. It seems to be a little shy in bearing. It must not be allowed to get too ripe. A very good pear for market purposes, and which will command a good price, is the Easter Beurre. Then comes the Lawrence. The Seckel is considered ahead of the last in selling value; but to say that it is profitable in the market is quite another thing. It is not profitable with us. We have had little or no experience with the blight. I do not know of an orchard in our section of the country that is suffering from it. I hardly know how to account for that.

Mr. Orr.—I have between one and two hundred pear trees out, most of them set out within the last five years. There are about fourteen or twenty that are about fourteen years old. They have been bearing abundantly since they were six years old, but the Bartletts were blighted this summer. I think the Flemish Beauty the most profitable. The Bartlett commands the best price, but the Flemish beauty bears twice as much as the Bartlett. The soil where the Bartlett blighted is sand. Where the Bartletts are doing well, and where the Flemish Beauties are, is a loam with heavy red clay subsoil.

Mr. Willard.—I believe the cause of peach yellow, if ever ascertained, will be found to be the same as that which produces the blight in the pear. I believe that the investigation that is now going on in the minds of some of our scientific men in the country, as well as in the minds of men who are practical, is going to result in giving us ultimately varieties of pears that will be more or less free from the blight, while at the same time combining productiveness to a sufficient degree to make them profitable. As I said with regard to grapes this morning, I am a great stickler for blood, and I believe we have to look in a measure to something that gets back near to the seedling for a variety of pear that is not only going to be free from blight, but also to be sufficiently productive to be profitable. I believe that the Seckel is one of those varieties that to a very great extent throughout the United States is free from blight. I have never seen a pear called the Doctor Reeder blight, although I have seen it surrounded by trees that blighted to the ground.

A Member.—Hear, hear; that is so.

Mr. Willard.—The wood of the Doctor Reeder is very rugged, showing a ruggedness of constitution which abundantly fits it to resist disease. I have a list here of varieties which I have found to be quite free from blight. The Sterling is one which, I find, has never blighted in Michigan. The Seckel I have mentioned. The Rutter, a pear which originated in the vicinity of Philadelphia, shows by its growth that it has a rugged constitution. I have seen the Bartlett, the Flemish Beauty, and the Clapp's Favourite on my own ground blight around the Rutter, while I have never seen the Rutter blight at all; and while not of the highest quality, the Rutter is as good as the Duchess, I think. He wrote to me this fall that if I had sufficient of those pears I would have no trouble in getting ten dollars a barrel for them; and I am quite satisfied with that. Another pear which may be known to some of you is the English Jargonelle. It is an early summer pear. I have seen it in an orchard in which everything else around it was blighted—in which there were perhaps no trees five years ago—and yet that English Jargonelle stood there without a single blighted stick in it. The Duchesse d'Angouleme is not inclined to blight very much. I have found the Doyennè Boussock not inclined to blight. I have growing on my ground, surrounded at one time with Bartletts, Clapps and Flemish Beauty which have since been swept off by the blight, standing there with them untouched, three of the Chinese Sand pear. I have been growing from them some seedlings. What they may amount to I do not know, but I made up my mind there was some good stock to work on any way. I do not think the Chinese Sand pear amounts to anything as fruit, but I understood there were those who regarded them as a great cooking pear. There is a man in Pennsylvania who has originated a pear which he claims as bred from the Chinese pear and the Bartlett—the Kieffer. As soon as I heard of it the thought struck me, "He has got a good thing there," and I accordingly tried it a little, and my experience in relation to it is this:—I found last year away out in the outskirts of Kansas a man growing them who said they were blight proof. I have planted a tree of it which I procured two years ago; and this year, although the tree has been cut to pieces for buds, and handled as badly as it could be, we had eleven perfect pears on it. I have seen it fruit in the nursery. It has vigorous foliage; and, I think, a good deal of foliage. Give me a plum tree that will hold its foliage as I would like to have it, and I will give you a tree that will stand the winter as a rule. Well, now, the foliage of that tree is like the foliage of a Lombardy Poplar. I was afraid somewhat in regard to its hardiness until last winter. Last year I planted out twenty-three trees, and as I wanted the wood pretty badly at the time I cut them off about three feet high. Well, those trees wintered perfectly, and this year we cut an immense amount of buds off them, notwithstanding the severity of the weather. The productiveness is beyond all question. There has been a difference of opinion in regard to the quality, but not greater perhaps than exists with regard to the Beurre Clairgeau. I have eaten Beurre Clairgeaus that I did not consider better than raw turnip, and I have fruited them myself of superior quality. With regard to all these pears I assume that their quality is enhanced or reduced very greatly by the manner of handling them. I had fears that that pear, originating in a warmer climate, might not do equally well with us up there. I went one day to look at them, and I found five of them had been taken by somebody else, and that there were only six left. I put

them in my fruit house, and there they lay until the first of November. I then went out to look at them, and took one of them to our table at dinner, and sliced it up and passed it round; and my family liked it pretty well. Another I took to my office that evening, and cut it up and passed it around to those who thought they were judges, and asked how it was liked, and the universal testimony was, "I wish I had a barrel of them to eat." There has been a variety of opinions with regard to that pear, but where it is well ripened and well handled I have no doubt it is a pear which will meet the views of the American people generally. So far as their style is concerned it is a style that will sell them, though it is not of the highest quality.

Mr. Drury.—The remarks of the gentleman who has just spoken, I think, are very much to the point. I have no doubt he is a reliable authority in matters of this kind. For my part, I feel interested in this, because we can grow the pears in the northern country where I live, but felt a little doubtful about going into their growth on account of their liability to blight. I think there is great reason in what the gentleman has said. We see the truth of it in the animal kingdom. We know that the superior breeds of cattle, sheep, and hogs are more or less liable to diseases to which the lower breeds are not. On my own place some pear trees as far back as I can remember were killed down to the ground—every one of them. I do not know what the reason was, but I am pretty sure it was not the blight. They have all grown up again; and they are a picture of health. They are bearing a lot of little fruit which does not amount to anything; but they are hardened to all influences. I am led from this to think that it is possible that we may strike upon a hardy kind of pear that may be suitable to this country. A year ago I was in various parts of Ontario, and I saw eveywhere evidences of the blight. Just north of Simcoe, in the County of Norfolk, I saw a large orchard of pear trees—I think about five hundred, and I think mostly Bartletts and Flemish Beauties—and I said to the gentleman, "I think that is about the finest orchard I have seen. How have you escaped the blight?" He said, "I have been in the habit of painting our trees with raw linseed oil, and I attribute my escape to that." In the immediate vicinity there were evidences of the destruction of the pear tree wholesale. I have mentioned this to several gentlemen who are interested in pear growing, and they have said there is nothing in it; but if that is a preventative of blight it should be generally known. In that whole orchard there is not a single tree that had a sign of blight. I think the trees were seven or eight years of age; but there were trees in orchards all around of the same age that were blighted. He had painted with a paint brush up to the limbs. He had been doing that every year for several years.

Mr. A. M. Smith.—I heard of the same orchard this fall. I think a great many of you will remember that our friend Springer thought he had a remedy. That was, splitting the bark; but in the seventh or eighth year the blight struck them.

Mr. Saunders.—This linseed oil remedy has been the rounds of the horticultural journals these last two or three years. Another remedy was a mixture of sulphur and lime and carbolic acid. I have understood from people who have used both these remedies that in some instances they have succeeded, and in some they have not. I do not know whether the fault, where they have not succeeded, has been in the insufficiency of the application or not.

Mr Woodward.—My trees are all Duchesse; and I have never yet lost one of them by the blight. They are dwarfs. I apply to them a combination of salt, phosphate, and ashes. Sometimes I add a little copperas—scattered around among the trees. I have one orchard on which I put this composition each year and manure it a little with barnyard manure; and this three or four years it has escaped blight. I think the pear blight attacks the tree from the outside, and works into it. I have also a Bartlett orchard. It is a small orchard; there are perhaps fifty trees in it; and I have not lost any Bartlett trees in a long time with the blight—never since I began to take care of them and apply this dressing every year. That orchard pays me very well. I cannot say that that remedy is a preventive entirely; but so far it has been very satisfactory.

Mr. Arnold.—With us this blight attacks the present year's wood. How would you apply the remedy in that case?

Mr. Woodward.—Cut it off.

Mr. Arnold.—The Rutter has been free from blight with me for a good while, and the Goodale also. That pear is a fine grower. It is a good one to look at, and it is a fair pear to eat. I have very little faith in the different kinds of washes. The English Jargonelle is a miserable grower; when we get the pears they are not fit to eat. They are not the English Jargonelle here; they crack and go to pieces, and they rot everywhere, inside and out.

Mr. Saunders.—I began an orchard some ten years ago with 150 varieties; and I feel just as undecided as to what ten or twenty pears I would select if I were going to plant out an orchard again as I was at first. I coincide with what Mr. Willard has said with regard to the Reeder pear; I have never seen it blight. At the London asylum they have nine Dr. Reeder's in a row, and they are as healthy to-day as any trees you could wish to see, while all around them the other trees have nearly all disappeared on account of blight. I thought at one time the Malines was free from blight; and so it was for quite a number of years; then there came a blight which took nearly the whole of my trees. Then I thought the Clapp's Favourite was going to be free from blight. They were so for several years; but at last they nearly all went too.

Mr. Woodward.—I do not wish to be understood as saying that the Duchesse never blights. It does blight; but with careful treatment I have avoided it.

The meeting then adjourned until ten o'clock the next day, when, upon the President calling the Convention to order, the question "Which Pears are the Most Desirable for the Amateur?" was added to that which was under consideration the previous evening, and the discussion of the two together was proceeded with.

Mr. Beadle.—I will name one pear that I think the amateur will like—I do not know anything about its value for market—the Josephine de Malines. Somehow I like that pear as the best of our winter pears. I do not know that it is the best; but I happen to know more of it, perhaps, than of some others. It is a very pleasant-flavoured pear; and when you cut it the flesh has a pretty pink tinge, which adds a little to its beauty. I suggest that that pear would be a desirable one to recommend amateurs to grow for a winter pear.

Mr. Holton.—I think I remember last year that the President laid some of them on the table here. Can you give us any idea of how long it can be kept?

Mr. Dempsey.—I have fruited the Josephine de Malines for several years; and I was induced to plant it in the first place from having seen specimens of it on Elwanger & Barry's grounds at Rochester. I carried some of them home and ripened them carefully, and the fruit was so delicious that I was induced to plant fifty trees of that variety. They come into bearing so very young, and the pear was so very different from what I had seen on their grounds that I top-grafted them. Since then I have been top-grafting them back. They require age; but the fruit is very fine when the tree comes to be ten years years old—with the first specimens you would be perfectly disgusted. Perhaps I I could not put it in stronger terms than to say I want no other winter pear. After it acquires a little age it is very prolific—sufficiently so, at all events. It bears a good average crop annually. The fruit is sufficiently large; the fruit is not large, but medium sized, and it ripens easily. You can throw them in a pail or in a box in the cellar, or you can mix them with a lot of turnips if you like, and every time they come out all right. They are very pretty when peeled; only they are so juicy they appear to be oily. With care they can be kept until March. If they are kept in a warm cellar they are just in their prime now. The Vicar of Winkfield is very fine this year with us; but this is the first year, I think, for as many as fifteen that I have had them to mature. It is a very fine pear when you get it in perfection; but you may only get it once in twelve or fifteen years. He who plants Vicars with a view to obtaining a dessert pear is quite certain to be disappointed, as they are very inferior when not properly grown. There are several varieties of pears that were not spoken of yesterday that are doing nicely with us. Manning's Elizabeth, I think, is one of our finest pears. Osband's Summer also; and I enjoy a good Rostiezer. These are all good summer pears. Another is Beurre Hardy. I think that of all the autumn pears we have, Beurre Hardy stands at the head of the list. It does upon my grounds. I have never seen any of the branches blighted. I do not say any pear is free from blight. I would also name besides these

Clapp's Favourite for a summer pear. With respect to Mr. Willard's theory of obtaining blight-proof pears, a few years ago they accused me of having pear on the brain. I was experimenting largely by hybridizing different varieties; and the worst of my seedlings to blight was the result of a cross between the Duchesse d'Angouleme and the Seckel. I think they are all gone. Those that appear to resist the blight best are the result of a cross of Osband's Summer with Duchesse. I have some seedlings that are very fine, but not fruited yet, which are from that cross. Therefore I fancy we have as good a chance by selecting the tenderest as by choosing the hardiest; they seem to become acclimatized. I take a good deal of pleasure in studying the theory of Van Mons, who has done more, I think, than any other man to improve the pear. He never hybridized, but supplied the seeds from the first seeds that were produced on a seedling; and he always argued they continued to improve until the third or fourth generation. After that they commenced to deteriorate. It always appeared to him that the first blossoms on a young pear tree were quite likely to be fertilized from a neighbouring tree; consequently that he actually obtained crosses until the tree had attained some age.

Mr. Biggar.—What is your success with the Duchesse d'Angouleme?

Mr. Dempsey.—The frost affects it; but it is a good fruit. I do not want to eat it. The Duchesse d'Angouleme matures in December. I do not fancy that coarseness that it has. I should have said something about the blight, perhaps. In our section of the country everybody was planting Flemish Beauty pears a few years ago. I had that fever myself until I got five or six hundred of them, and they went back on me. A fruit-grower there was priding himself two years ago with having the finest pear orchard in all that part of the country. I visited his grounds last summer; and it would be a little too hard to say that there was not a pear tree there then that was worth anything; but really I think that if I did so I should be telling the truth. They were all blighted. However, I attributed that to the dry weather more than to any other cause.

Mr. Orr.—What is your objection to the Seckel?

Mr. Dempsey.—If I were to speak with regard to all my favourite pears, and to include all the varieties that I liked the list would become very large. I have fruited about two hundred varieties. My aim simply is to recommend a pear that will sell in the market, and at the same time be an amateur pear. The Seckel is not profitable to produce for market purposes; but I will ask nothing better to eat than the Seckel pear in the season. The system that we have adopted for pruning standard pears is to let them do that themselves; we do not prune them at all. I fancy the less cultivation they have the better. With respect to manuring, we find nothing that will swell the fruit so rapidly as sulphate of iron—common copperas. Just dissolve it and apply it in a liquid state in the summer occasionally. Sulphate of iron and ashes are two of just about the best fertilizers I have ever found for pears. The manure should be, I fancy, applied to the surface of the soil.

Mr. Biggar.—Some four or five years ago I sent in some pears with a young man, I coming on the cars; and when I arrived he told me the fruit dealers here said the fruit was too large. These pears were Flemish Beauties. I sold them at twenty-five cents a basket more, however, than I sold my smaller ones for. I had not many large pears until this year, when I sent three baskets of very large pears to a fruit dealer, telling the young man who took them that if she objected to them he was to take them to another party I named. Just as I expected the first person I sent them to refused to take them on account of their being so large. They were too large to sell. I find that the Flemish Beauty overbears with me. I have been in the habit of pruning back every year about one-third of the new wood. Would the pruning have any effect on the bearing, do you think.

Mr. Dempsey.—My experience is different from yours. We often have the thermometer sink to thirty below zero in the winter. Pruning would not do with us, though it might with you; because pruning increases the wood. The Souvenir du Congres was the only variety that I missed any from last winter on account of the frost. We had shoots of about four feet growth on them; and they grew so fast that they were not prepared for the severe frost in the early part of the winter. I find that I can grow a

variety in our section by not pruning it, which will stand the severity of the weather better than one that has been pruned, from the fact that it is not so vigorous in growth.

Mr. Willard.—I question whether there is any one winter pear so valuable to the orchardman or to the amateur as the Josephine De Malines. It approximates very closely to the seedling. It is, perhaps, the most uncouth pear growing—with one exception, and that is the ————; yet it is very free from blight. With respect to the fruit not being satisfactory in its early stages, you must give the tree a little age to have it produce the fruit in perfection. The greatest success in the shape of a pear orchard that there is in the United States to-day is one the owner of which would not allow a man to put a knife to a tree in it; he says that anything that tends to disturb the circulation of the tree might tend to cause blight.

Mr. Morris.—I have noticed that pear trees planted on low, moist, rich soil are usually subject to blight, particularly if there is much vegetable matter in the soil. This induces a growth late in the season, and where that is the case you nearly always see blight the next season. I have noticed again that where trees are planted on a high knoll, particularly if it is on the edge of a ravine, you always find healthy trees. I think one of the greatest causes of blight is the long trunks of the standards. I have seen orchards in which the tops have been blighted, but which were allowed to grow from the bottom, that have afterwards remained good, healthy trees for years. I think that by proper selection of the soil pear growing might be made one of the most profitable branches of fruit growing.

Mr. Biggar.—I have not been troubled with blight except in one variety. I prune off the blighted wood as much as possible, scrape it, and give it a coat of linseed oil. Any time in the year that I find a tree is blighted I immediately take off the blighted part. My standard trees are all tall. I believe it would have been better if I had kept them close to the ground. My Clapp's Favourite is gone altogether with blight; but the blight has not prevailed to any great extent in my grounds. I use nothing but ashes for fertilizing my trees, which are healthy.

Mr. Dempsey.—We had a good deal of blight this last summer. There were only a part of the pear trees in our garden that ashes were applied to; and, strange to tell you, we had scarcely any blight in them at all; but where the ashes had given out we lost several trees from the effects of the disease.

Mr. Arnold.—We have had no blight in our section the last two years; and we have used no ashes. The thought occurred to me while I was sitting here that it was a dangerous thing to spout about new pears. I think that a man should have from ten to fifteen years' experience of a pear before he ventured to express an opinion of it. If I was to speak of any pears at all I would confine myself to the old varieties. I would even go back to the old Bloodgood that I have rejected two or three times in my lifetime. There were several old pears that were not mentioned. There is the Rousselet Stutgart, which is a splendid pear, very like the Rostiezer. The Seckel is a good pear with us if we get it on the right kind of stock, and it has arrived at an age of about twenty-five years. It is rising in my estimation. As for the Tyson, I would not be without it. I think it is equal to the Seckel in flavour; and it is three times the size. We have not heard the old Belle Lucrative mentioned. I always think that is hard to beat. It grows to a good size with us. It is not equal to the Bartlett, of course, in that respect. It is very variable in appearance. You might pick three or four different kinds of pears, you might say, off the same tree. The Duchesse as grown on a quince stock and as grown on a pear stock are altogether different pears. I never saw a Duchesse worth looking at grown on a pear stock. It is not half the size with us grown on the pear stock that it is grown on the quince stock. The Winter Nelis is a very ugly looking pear, but an excellent one. The Vicar of Winkfield I would not have in my ground if I could grow the Glout Morceau; but I cannot grow it on my place. Mr. Saunders grows it. There is no profit in winter pears; because you cannot rely on them. You may pick winter pears all at the same time, and pack them all away in the same place, and yet you will find that while some of them will turn out excellent, others will not be fit to eat.

Mr. Saunders.—The Glout Morceau is one of my favourite pears; and for some

reason or other it appears to be less liable to blight on my grounds than any other variety I grow. The fruit is very good. It grows to be a good fair size with us, and ripens uniformly—that is, the pears will nearly all ripen about the same time. The Glout Morceau is a pear I would not like to be without; and yet it is a pear I would not like to recommend other people to grow, because generally it is a failure. The Tyson is one of my favourite pears also; and I find it produces more fruit to a tree on an average than any other pear I grow. Still, it is not a large pear. It is a very delicious pear; and it comes in at a season when pears are very acceptable.

Mr. Holton.—It has always been the impression that the Duchesse grown as a standard was a failure. My experience with it is very different. To me the flavour of it grown on the pear is equal to what it is grown on the quince. I have grown it several years in this neighbourhood on sandy loam, and fruited it; and it is a fine cropper, the fruit is always fair, and it brings you a good price. There are a couple of summer pears that have done well with me. One is the Beurre de Koning, and the other is the Suprême de Quimper. It has proved a strong tree, and it is doing well. The pear is a little larger than the Seckel, and is a good colour.

Mr. Saunders.—Another pear that we find very successful about London is Elliot's Early. It produces a good crop of pears large in size; and they have a blush of red on the cheek sometimes. It is a pear there seems to be money in, coming in, as it does, early—so early in the season that there is nothing else to compete with it but the Windsor Belle, which tastes like a mixture of sawdust and vinegar. The Beurre de Koning with me is too shy a bearer to induce me to plant it to any extent. It does not seem to thrive in our cold climate. With me it is a poor bearer.

Mr. Arnold.—I would like to ask Mr. Holton if all his Duchesse, grown on standards, have produced equally good pears. If he has a quantity of them that have been grafted promiscuously on pears, it is a pretty good proof that the Duchesse can be successfully produced in some districts on standards.

Mr. Holton.—I have about half a dozen trees of them. They are now fifteen or twenty feet high perhaps. They are uniformly good.

Mr. Arnold.—No one would own my Duchesse on a pear stock.

Mr. Willard.—Probably there is no one variety that is growing in demand so highly in Massachusetts—which is probably the greatest pear-growing State—as the Duchesse as a standard. During the last ten years the demand for that variety, as a standard, has increased, I presume, fifty per cent.

Mr. Gott.—There is a prejudice against dwarf pears in this country. They will have them standards or nothing at all.

Mr. Wellington.—That must be owing to the different part of the country you live in; because our experience is that you can hardly keep up with the demand for dwarfs at present.

Mr. Dempsey.—In a section of country where there is not much snow, it is exceedingly risky to graft pears on the quince.

Mr. Arnold.—We work our dwarf trees right down to the ground. Some years ago a gentleman applied to me for some Dwarf Seckels. I said to myself, "the man does not know what he is talking about; a Dwarf Seckel is perfectly worthless grown on the quince stock." I ventured to offer him some on a pear stock; and that gave him a tolerable Seckel.

Mr. Morris.—My experience of the Seckel on the dwarf is that it makes a perfect union. A great many of the failures in the dwarf pears come from budding on too small a stock. I have seen them myself budded on a quince not much larger than a lead pencil. The result is that you have a tree with a very large shoulder, and that often breaks off.

Mr. Saunders.—My best Seckel pear is on the quince stock.

Mr. Beadle.—I have about as beautiful trees of Seckel on the quince stock as I have ever seen, and I get finer specimens of fruit from it than I can off the pear stock.

RASPBERRIES.

The Association then took into consideration the two following questions, viz.: "Which are the most profitable varieties of raspberry for market?" "Which are the most desirable for amateurs?"

Mr. A. M. Smith.—Which are the most profitable varieties depends, in a great measure, on how near you are to market. There are very few varieties of raspberries that would stand shipping a long distance. I have found fully as much profit in the Highland Hardy as in any raspberry I ever grew, for this reason—that it is the earliest. You do not get such an amount of fruit; but you get it so much earlier that it will command a much higher price. Perhaps if all of us went to cultivating it, it would soon become depreciated in value. We got for our Highland Hardy this year about double—yes, quite double—what we did for our Philadelphia; and the crop was probably about two-thirds as large. For a near market, I consider the Clarke a profitable raspberry. It is large-sized, and has a fine colour and flavour, and it will always command a very high price. But it is too soft to ship. And the same might be said of the Herstine—with this exception, that it is a little tenderer variety. It does not succeed in all localities as well as the Clarke. I do not doubt but that the Philadelphia for the million is the best raspberry that has been tested yet. It is as hardy, probably, as any of the less prolific; but its colour is against it. It does not bring such a high price in the market as berries of a better colour. I am inclined to think that the Cuthbert is the coming red raspberry for the market. I have only fruited it this season for the first, and that only on a small scale. It is a large berry; very fine colour, and moderately firm, and I should think would command a good price. For amateur culture I do not know of anything much better than the Herstine and the Clarke, in red raspberries. Where the Herstine will succeed, it is a very fine berry. I would not recommend it, though, outside of the peach-growing line. It is inclined to winter-kill. I have a seedling of my own that I call the Niagara, which I consider valuable as a late berry. It is larger than the Philadelphia; firmer, and of better quality, though perhaps not quite as good a bearer; and it is about a week later. Of the Blackcaps, I have generally found most profit in the Davison's Thornless and the Mammoth Cluster. I think the Gregg is, perhaps, going to supercede these for profit, though I have only fruited that one season.

Mr. Gott.—For largeness, and beauty of fruit, Naomi and Turner stand very high. Both those varieties are very profitable. The canes are hardy; grow very high and thrifty; and the fruit is abundant and well-proportioned. The Clarke is also a very profitable fruit; very highly flavoured, fine size. The cane is hardy and very thrifty. The Philadelphia is well known. It is considered a profitable fruit. The Highland Hardy and Brandywine are near relatives in appearance and quality. Neither of them is considered profitable. The only merit in them is that they are early. The Cuthbert is promising. With us it is the coming raspberry. The cane is very thrifty. It is an abundant bearer; quite hardy; and the fruit is very large, handsome in form, and of fine quality. Mr. Saunders' No. 55 has been tried. It is something like the old American Ganargua; and it has been said that it will have good quality. We have not sufficiently tested it yet. Among the Blackcaps we would name as first, in point of profit, the Mammoth Cluster. The Gregg is likely to supercede it, however. The Gregg has all the good qualities of the Mammoth Cluster—with the additional merit of being a little larger—having a little more bloom, and coming a little later in the season. Davison's Thornless is not profitable. Seneca is profitable. It is a most robust-growing bush; it is almost impossible to kill it by cold or other means; and it is sure to produce a crop. The Ohio is a great producer; but if it is allowed to produce a very heavy crop in the former part of the year, the crop in the latter part of the year will be very much weaker.

Mr. A. M. Smith.—I neglected to mention Mr. Saunders' hybrid. For an amateur berry, I know of nothing better; but its colour is against it as a market fruit. It is generally admitted, I believe, that where the Franconia will bear, it is a very fine berry. I have found it too tender.

Mr. Wellington.—Until the last few years the Franconia has been the berry, as

regards price and colour; but the cold weather has destroyed it. My opinion is that the Cuthbert is going to be the raspberry. It is of good size and colour, has a good shape, and is very productive. It seems to have the peculiarity of dragging its crop along for a greater length of time than most other varieties. The Turner I believe to be a good berry; and in conversation with Mr. Hooker, of Rochester, one of the largest fruit-growers on the other side, he says that the Turner is with him one of the largest raspberries he has. The Philadelphia is, I think, going to be done away with. It is not a berry that takes well in the market. The colour is against it, with the dealers in Toronto; they want something of a lighter colour and better size. The Herstine is a good berry; and my experience is that it can be grown outside the peach-growing district. But it is not a shipper. The Gregg I believe to be the best of the Blackcaps; but I do not think it will supercede the Mammoth Cluster, because it is a little later. There is one berry that I think the amateur should cultivate any way, and that is a yellow berry, the Caroline. As far as tested it has proven hardy, a very good cropper, and a berry of good quality.

Mr. Willard.—I have been interested a little in the Cuthbert; and I had reports from Kansas last spring that the Cuthbert had stood the severities of last winter better than almost any other berry there. I have raised a great many berries for the Philadelphia market; and I have found the Highland Hardy one of the best for profit that I have raised, simply because it comes in very early. It has invariably brought me twenty cents a quart in Philadelphia. I have no doubt the Cuthbert will prove itself worthy of all that has been said about it this morning.

Mr. Beadle.—What does Mr. Willard know about the Caroline?

Mr. Willard.—I do not know anything about it, any more than I have looked into the matter a little with a view of planting it, and I do not want it. Our people want a bright attractive berry, and one that is hard enough to bear handling. Therefore the Caroline would not suit my purposes.

Mr. Wellington.—I have tested the Caroline, and I call it very good; but it is merely a berry for the amateur on account of its colour.

Mr. Beadle.—I was very much disappointed last summer in the Caroline that was grown on Mr. A. M. Smith's grounds—I have not fruited it yet. I was down at his place and saw the fruit there, and he kindly, afterwards, when it was more perfectly ripe, sent me a basket of it; and I was very much disappointed in the quality. It was almost flavourless. It had a pretty colour, somewhat resembling Brinkle's Orange, but a long way off from it in flavour.

Mr. A. M. Smith.—I would simply say, in regard to the Caroline, that it has something of the Blackcap habit of growth. The first season it droops over and lies on the ground. The plants fruited on my place when they were only one year out; and the berries were picked from near the ground, where the bushes were lying down, and quite shaded by the very strong growth of the new shoots, which might account in some degree for the insipid flavour. It is apparantly a very hardy berry, and it has this peculiarity: it propagates both from suckers and the tips. There has been a want felt among amateurs for a good, light-coloured raspberry—something of the nature of Brinkle's Orange—that was hardy enough to stand this climate; and I was in hopes we were to get it in the Caroline; but, if its flavour is no better than it was on my place this year, I cannot speak very highly of it. In regard to the Turner, I consider it would be a very valuable raspberry for the colder parts of our country—in sections where the Clarke, Herstine, and some of our finer varieties will not succeed. The Turner, I am told, will succeed almost anywhere. The only objection I have to it is its profuse suckering. In regard to the Brandywine, it is claimed that it is an excellent berry for shipping. I presume it would be; but there is that same objection to it with regard to suckering; and it is also small. Mr. Gott mentioned that it came about the same time as the Highland Hardy. My Brandywine is a good deal later.

Mr. Dempsey.—I think raspberries a very profitable crop. I think they rather surpass the strawberry in point of profit. I adopt the same principle in recommending varieties of the raspberry to the people that I have recently done with regard to apples. I say to them, "Go to your neighbour; ascertain what variety of apple is succeeding; pick

a specimen of that apple and send it to the nurseryman you wish to patronize, and say, 'Send me so many trees that will produce apples just like that; if they do not, I will prosecute you.'" Otherwise, I find that the nurserymen sometimes do not send the same varieties that I recommend, but I have to be responsible for it. I have a neighbour that would not plant anything else in raspberries than Davison's Thornless and the Blackcaps. Well, I failed to succeed with Davison's Thornless. The Seneca I find a very profitable berry, except in regard to one thing, that is it matures so irregularly. It commences to ripen middling early. It is not an early berry, however. We do not get enough berries at a time. In this respect, I would prefer the Mammoth Cluster to any other berry that we cultivate, from the fact that our pickers can clear the vines in about three pickings, and it is very fine fruit. I do not think the Gregg will ever supercede it, from the fact that we want them both; the one succeeds the other. I have every confidence in the Gregg. With respect to some of the red varieties, the Philadelphia is wonderfully productive and hardy; but when you have said that, I think you have said all for it, there are so many varieties that are superior to it in point of flavour, colour, and shipping qualities. I like the Herstine better than the Clarke on my grounds. I find it sufficiently hardy. I have never seen an inch of it frozen in my life. The Turner, I think, is going to be very profitable. It is a little in advance of the Philadelphia—not quite so productive; but it is a larger berry and a little better berry, and I fancy it will stand shipping better. It is inclined to sucker a little more than the Philadelphia; but the cultivator can easily overcome that. The Cuthbert I am perfectly well satisfied with. I fancy that we shall never get too many of them; because they ship very nicely.

Mr. Woodward.—I am not a raspberry grower now, except for family use. The most successful plantation of red raspberries about Lockport—the one that has been established the longest, and the one that has made more money for the grower than has been made out of any and all other varieties—is of the Franconia. It has stood every winter we have had perfectly; and it bears abundantly, and brings the highest price. A gentleman there, who has been dabbling in the newer varieties, told me that he would rather have the Franconia than all of them. I should want, in Blackcaps, the Doolittle for an early berry. It is a good, productive berry, and the earliest of the good ones that I know of, except the new one, the Souhegan, which, I am told, has some merits. And then there is the Mammoth Cluster. I would grow those three if I were growing for market and for drying.

Mr. Beall.—Brinkle's Orange is reported everywhere as being very tender, and the Philadelphia as being very hardy. I grow both of these, side by side, and one is equally as hardy as the other, in my ground.

Mr. Dempsey.—Brinkle's Orange stands with us.

Mr. Beall.—The same number of plants with us will produce more quarts than the Philadelphia; I think fifty per cent. more.

Mr. Dempsey.—One quart of red raspberries with us will fetch more than two quarts of yellow ones.

Mr. Arnold.—I do not know whether we have a better raspberry yet than the Franconia. The Highland Hardy I rejected years ago. It sometimes seems to me that it is like that great strawberry, the Mexican or Maximilian, it has to change its name every few years to keep in existence. The Highland Hardy has been called by different names. It is early, and stands the winter well; but it is so remarkably small with me. If we want size, and if it will stand the winter, let us go back to the old Hornet. Who ever had a larger or better berry than that? The Belle de Fontenay, if we can get rid of the suckers in it, where can we get a better bearer? It bears splendid crops. I thought I was having good success with berries; but a neighbour took me to the north of his house and showed me some Yellow Antwerps that made me ashamed of mine. There is too much wood in the Blackcaps to suit me. There is less in Mr. Saunders', because they are a cross between the two varieties.

The following paper by Dr. Warder was here read by the Secretary :—

THE CLIMATIC INFLUENCE OF TREES.

BY JNO. A. WARDER, M.D., NORTH BEND, HAMILTON CO., OHIO.

Mr. President and Gentlemen of the Ontario Fruit Growers' Association :

After hearing the paper on "Protection to the Orchard" read at the recent Pomological Meeting in Boston, Massachusetts (September 15th, 1881), you, Mr. President, conferred upon its reader the honour of an invitation to prepare a lecture for presentation at the approaching meeting of your Society at Hamilton, Ontario.

The proposition was accepted with hesitation—partly on account of impaired health, but mainly because of an apprehension that yourself and your worthy *confrères*, as fruit-growers, would be disappointed in the character of the topic selected—"The Climatic Influence of Trees." However, after traversing a portion of your beautiful and productive Province in the lovely days of October, and after beholding the wonderful progress that has been made by your citizens in clearing off the dense forests that once clothed your fertile soil; while observing and considering the changes consequent upon converting the woodland into the farms, the forest into the prairie—the conviction became stronger that the theme must be drawn from that group of topics, which deserve so large a share of the thoughts and consideration of the American farmers and statesmen.

A perusal of such numbers of your valuable transactions as have been kindly furnished by the secretaries of the two leading societies of the Dominion, also assure the writer that such a theme as the one about to be presented may be welcomed by you, and he feels encouraged by finding that, on your side as well as on ours, forestry is becoming an important question, and that, to some of you as well as to some of us, *the sprite will not down*—the question must be met: the sooner the better! Nor should the great interests involved in the word be ignored, either by agriculturalists or statesmen. It is high time that our attention should be directed to a consideration of the subject in its bearings upon the agriculture of our continent and its future maintenance and prosperity.

The transactions of the Ontario and Montreal Societies already contain evidence of your interest in forestry, as shown in the valuable papers relating to Canadian forests by Mr. A. T. Drummond, Mr. Jas. Little, Mr. H. G. Joly, Mr. G. M. Dawson, Messrs. McAinsh, G. Peacock, and others, which may be read with profit, and which show that your attention has already been directed into this channel, all of which encourages me to continue. At the same time, the intelligence and the familiarity with the subject thus displayed by your own members, might well cause a stranger to feel some diffidence and hesitation on entering an arena with which you are supposed to be so much more familiar than a casual visitor. It is, however, but a limited portion of the subject which it is proposed to discuss at this time, Mr. President, and as you are aware, the task is undertaken only after having consulted you, and having received your approval of the discussion of "Wind-Breaks, and Shelter Belts, and Sheltering Groves for Ontario."

Reference has already been made to the extensive clearings that have been effected by the generation of men now occupying the interlacustrine region of fertile lands in Upper Canada. It seems almost incredible that in half a century or less, so vast a change should have been effected in the condition of this broad plateau, as is evident even from the car windows of the rolling train. Over wide areas the forests that once encumbered them have disappeared, leaving no traces of their former existence in the smooth and wide savannas of smiling fields, covered with bountiful crops and beautiful herds. In a brief period the howling wilderness of woods and swamps, which greeted, and might well have repelled, the sturdy settlers, has been transformed by man's persevering industry into the smiling prairie. Wonderful transformation!

The very stumps of the sylvan monarchs have been rooted out; the soil has been tamed of its wildness and brought into the highest culture over wide tracts; and, with the evidence of high farming that so generally prevails, there have come also the improved

animals to consume their share of the products, and to aid in maintaining, or even in enhancing, the natural fertility of the soil.

One of the most striking features of the country traversed, next to the apparent fertility of the land, was the broad extent of the tillage, where large fields made parts of great farms, and these were bounded on all sides by other farms of apparently equal dimensions lying contiguous to them on every side, or with small intervening wood-lots that could rarely be called forest lands, for their limited extent, and their rifled condition, would hardly entitle these bits of woodland to be called forests—they are but shadows of their former selves.

Looking out from the car-windows, on either hand one might behold vistas opened over these fields that extended in many cases for miles without the interruption of a grove or a tree, or even a stump or a bush!

Here, then, while finding so much to admire in the results of the industry of the settlers, who, in half a century or less, had effected so great a change upon the earth's surface—here a theme was suggested to the traveller for him to present to-day to his friends of Ontario. This is what he now desires to impress and to emphasize—*The necessity* for you to protect yourselves, your cattle, and your crops from the storms of winter. He begs you to begin at once your efforts to modify and to meliorate your climate by restoring barriers against the winds which you have invited by too widely opening to them doors of access to your homes. He also begs you, at the same time, while beautifying your country, to provide against the future necessities of the people by producing in these plantations future supplies of fuel and lumber. Yes! even here, and on these fertile lands, this may be done, and by the wisest economy, by planting trees in protective groves, but especially in wind-breaks and shelter-belts on all your farms.

While occupying even a considerable portion of arable land, that would thus be withdrawn from the dominion of the plow, these plantations will, nevertheless, inure to the advantage of the farmer and of the country by enhancing the fertility and productiveness of the remainder of the land thus sheltered, as has been demonstrated on the open prairies of Iowa wherever these shelters have been applied.

The whole of the route traversed by the Grand Trunk Railway westward from Kingston, is very happily situated in respect to lacustrine influence which must greatly modify the climate of the region. The broad surfaces of those great inland seas, Ontario, Erie, and Huron, cannot fail to exert the well known effects of large bodies of water upon the atmosphere. It is, however, the region west of Toronto that is most happily situated in this respect, and here, too, the prevailing character of the soil seems to adapt the region to high farming. Here the lacustrine surroundings are most fully developed; and here, while enjoying the advantages derived from this source, the inhabitants must beware how they expose the country to the disadvantages that may arise from a too open exposure to the water. The winds must not be allowed too free an access to the land.

To obviate the effects of the winds it is advised to plant groves about the farmsteadings to the windward sides of barns and sheds as well as of the dwellings. These should by all means be supplemented by evergreen shelter-hedges and screens about the residence and out-houses. The fields and pastures should be protected by wind-breaks on every farm.

The wind-break demands a liberal space and the planting of numerous trees to make it effective. In a champaign country these shelters should not be more than forty rods apart, nor should they occupy less than four rods in width, though even a single or a double row of trees between two fields will furnish a great deal of shelter, especially if they be evergreen species.

The soil should be well prepared by thorough ploughing and harrowing, so as to produce a good tilth. To plant, parallel furrows should be drawn four feet apart, in which to set the little trees. This close planting is particularly recommended where the use of deciduous trees has been determined upon, but more space may be allowed for the evergreens, and where these are planted in single or double rows, with the trees of one row set opposite to the interspaces of the other, six or eight feet may be allowed. If the evergreens have been planted three or four feet apart at the first, alternate trees can be removed and set elsewhere when their limbs meet on either side. They will be saleable

to your neighbours, or they may be used in the extension of your own shelters; at any rate they will have already served a good purpose by rendering the screen more effective —they have paid their way.

The planting, particularly of evergreens, should be done in the spring, and care should be taken to preserve the roots from exposure to the sun and wind. If these delicate organs be once desiccated they never recover.

Planting small trees is a very simple operation, and may be thus performed on land prepared as already directed: a spit of the mellow soil of the furrow is lifted with a spade, the little tree is placed, its roots are spread out and the earth from the spade is thrown upon them—this needs to be well pressed by the foot, so as to bring it in close contact with the fibrous roots and exclude the air as thoroughly as possible—sufficient mellow soil is then thrown about the tree, so that it shall be buried rather deeper than it had been previously. Two men with spades and a boy with trees may constitute a team for this work, and carry two rows. A favourite plan in Iowa is to employ the small force in a single furrow that has been freshly deepened by the plow. One man follows the boy, setting the trees with his hands and tramping with his feet, so as to make them stand to the line, while a second follows with a hoe or shovel and draws in the earth. A cultivator or double-shovel plough is then passed along each side of the row.

The plantation should be well cultivated and kept clean for a few years, longer or shorter, according to the thriftiness of the species, but until the trees shade the ground, when they will take care of themselves. Cattle must be rigidly excluded.

Various combinations of species have been recommended for these belts, but, as a rule, in forestry, it should be borne in mind that evergreens and deciduous trees do not succeed so well when mixed as when each class is massed separately. To this there may be some apparent exceptions—the European Larch, and the Scotch Pines, or Norway Spruces are often found in the same group doing well together—so in nature we sometimes find similiar admixtures; but all the evergreens would be likely to suffer if they were mingled in a plantation with the rapid growing and umbrageous elms, cottonwoods, maples, and other broad-leafed trees. Beautiful and effective for shelter as are the evergreen conifers, however, these native deciduous species cannot be ignored, nor should they be neglected nor dispensed with by the farmers who may desire as quickly and as cheaply as possible to produce an effect in the shelter-belts. Let such an one begin with the poplars, willows, or with any other trees and cuttings that are at hand, always excepting the so-called Lombardy Poplar, which as an ornamental (?) shade (?) tree already shows its aspiring head in some of the western towns of the Dominion.

Indeed, both classes of trees may be happily combined without mingling them promiscuously; they may be planted in the same belt but in separate rows, putting the sturdy native deciduous kinds in a few rows on the outside, using the cottonwoods, white willows, etc., which grow freely from cuttings, and which rapidly produce an effective screen; next to these may come the elms, the oaks, maples, or white ash, and other kinds. These thickly set will soon rise and form a protection to the evergreens.

Mr. H. G. Joly, in the sixth report of the Montreal Society (for 1888), speaks in high praise of his cottonwoods, which, in twenty-three years, had attained the height of sixty feet with a diameter of twenty-five inches. This is a remarkable growth truly, and though the timber be not of superior value, the desired shelter is very quickly produced, and, as he wisely suggests, it will aid in protecting other trees. One form of the cottonwood is a great favourite in Scotland, where it is called the Black Italian Poplar, and perhaps the same kind is planted extensively in parts of France, where it is known as the Peuplier du Canada.

The European white willow (*Salix alba*) is another tree of similar characters—easily multiplied by cuttings, of rapid growth, and largely employed in prairie regions for wind breaks and shelters. When matured these soft-woods will be found to have great value for many purposes, though inferior to hard woods and resinous trees either for lumber or for fuel. The charcoal used in the manufacture of gunpowder is almost exclusively prepared from the white willow.

But your own native trees claim your consideration, and, as appears from your transactions, they have received deserved attention in your discussions. The noble American

oak ("Canadian!") (*Quercus alba*) merits the care of all planters, especially in the groves. Though it be rather slow in its early growth, it may be supported by rapidly growing species that must be gradually removed as the oaks need the space they have occupied. Oaks, or their acorns, may be planted among the poplars and willows of the outside rows, and they will be ready to spring into a vigorous growth when these pioneers are removed.

The sugar maples will make lovely groves that will yield their sweet tribute, as well as lend their beauty to the landscape while living, and furnish valuable timber or fuel when cut down. The invaluable white ash should be much more largely planted in groves and by the roadside, as it makes a beautiful and most useful tree. The American elm, too, has its uses as timber, and is especially adapted for avenues, where room is given for the development of its wide-spreading and wind-resisting branches. The wild cherry—the back, not the red—(*Prunus serotina*) is commended for its elegance, its thriftiness, and rapid growth, as well as for the great beauty and usefulness of its lumber, which is quickly produced.

In your discussions on the subject of shelter, as reported in one of your volumes, a native tree is named, which is well to have recognised for its beauty as well as for the merit you very properly attribute to it as a bee-pasture. The America linden or bass-wood (*Tilia Americana*) may very well be made a leading component of the home groves. Its rapid growth will soon make it effective, and its sweets will certainly be welcomed by the bees. The timber of the linden, too, has its uses, though very soft and inferior to many other species, and its inner bark has a commercial value as the material of bast matting, while the wood is used for paper pulps.

There are many other trees with which you can experiment in your planting, but they need not now be mentioned.

In the selection of evergreens for these shelter-groves and belts, the hardy natives of your own country should first claim your attention. Nothing can better serve your purpose than the common white pine (*Pinus strobus*), and the red pine (*Pinus resinosa*). Both are rapid growers when fairly started, and both are well adapted to your soil and climate. For a shelter-grove or wind-break they cannot be surpassed. Next to these, and in the same genus, come the foreign kinds, known as the Scotch (*Pinus sylvestris*), and the Austrian (*Pinus Austriaca*), which are rugged and thrifty; of great value, both growing and when felled; but not equal to our natives above-named, either for their future lumber nor in the rapidity of their growth. Neither of these can compare with our natives as ornamental trees, though they are often planted with that end in view. They belong to the forest rather than to the lawn, for which we have lovelier species.

Of spruces, you have the natives, the beautiful white spruce (*Picea alba*), and the black, which often has a blue tint (*Picea nigra*), and the variety often called red spruce —trees of medium size and beautiful, but excelled in size and utility, whether standing or felled, by the foreign exotic Norway spruce (*Picea excelsa*), which yourselves have decided, and very correctly, to be the very best of all evergreen trees for the shelter-belt, on account of its hardiness, its adaptability to all soils, its rapid growth, dense spray and foliage, and its comparative cheapness. The Norway is also a very pliable tree, and bears transplanting remarkably well; and in the shelter-hedge it patiently submits to the free use of the knife in close trimming. For the shelter-grove, and especially for the single or grouped trees of the lawn, nothing can excel the beautiful grace of form, nor the depth and purity of green presented by the common American hemlock spruce (*Tsuga Canadensis*). This species was common in much of your early forests, and must be familiar to you all. The hemlock has a northerly limit, as shown by Mr. Drummond's map, extending from the north-west and north-east coasts of Lake Superior, by the head waters of the Ottawa River, crossing the St. Lawrence below Quebec, and traversing New Brunswick to the ocean in latitude 47 degrees.

The hemlock makes such a dense growth of foliage and of slender twigs that it is perhaps the very best plant for the protective shelter-hedges that should be found about the dwellings and out-houses of every farm in your broad domain of Ontario.

The native balsam (*Abies balsamea*), as you seem to be aware, is hardy enough and very beautiful when young, but unsatisfactory for planting, because it is apt to grow shabby when older.

The red cedar (*Juniperus virginiana*) has a wide range, both north and south, east and west; though less extended than the other native evergreens, this juniper is found in your part of Ontario, and would be hardy enough, which is not the case with the Irish juniper and some other garden forms.

The red cedar has been called the poor man's evergreen in our western states, because of its abundance, its consequent cheapness, and the ease with which it may be brought into cultivation. Its growth is sufficiently rapid. Trees set out twenty feet apart have formed a close wall of sheltering green, while their tops have grown twenty feet high, with branches from the ground, and all within twenty-five years from the seed. This tree needs age to make its lumber valuable; while young there is too large a proportion of alburnum or sap-wood. When the red heart-wood is developed the timber is perdurable, and highly valued for posts, sills, and other uses where durability is required.

One of your most beautiful and most abundant native evergreens is yet to be mentioned—the American arbor-vitæ (*Thuya occidentalis*). This is erroreously called white cedar, which is quite a different tree (*Cupressus thyoides*), also found in parts of the Province, and reported in Mr. Dawson's catalogue, on the faith of Mr. Brown, on the great lakes.

The arbor-vitæ abounds everywhere on low lands, and Mr. Drummond reports it on his map as reaching to James Bay, in latitude 52° north. This plant is very abundant along the line of the Grand Trunk Railway, and in favourable situations immense numbers of young plants might be obtained from the mucky lowlands, but it may also be procured from the nurserymen, of any desired size and at low prices, in much better condition for planting out than those taken from the swamps.

The arbor-vitæ and the hemlock spruce, though admirably adapted for the construction of wind-breaks, are also the two very best species for planting as shelter-hedges upon the lawn around the gardens, and about the dwelling, and out-houses, wherever it is possible to introduce these screens. You are strongly urged to set them abundantly in all such places for the comfort they will afford to your families.

Plant hemlocks and white spruces on the lawn near your houses. The shelter-groves, to which allusion has already been made, should not be overlooked nor forgotten. These should be placed rather near to, and on the windward sides of your buildings. Select the site and prepare the soil thoroughly before planting out the trees you may have selected; set them closely to produce an immediate effect. Three rows in every four may be of inferior or cheap kinds, to act as nurses to the more desirable plants that are to remain permanently; the former must be removed as soon as these last need the space for their healthy development. Of course the whole lot should be well cultivated for a year, or until the ground is well shaded. Exclude all cattle from the grove—this is absolute!

Finally, my friends, lest you become aweary with too long an article, let us draw this to a conclusion, though you may rest assured the half has not been told had the discussion been intended to embrace all the trees that are worthy of your care in general planting. A few only have been introduced that were supposed to be especially adapted for the object in view—that of providing shelter-groves and wind-breaks in the open country to compensate, in some degree, for the excessive removal of the natural forests, which has already occurred in portions of your country, just as it has happened in our own States. In your north-western Provinces there are open prairies which must be planted, and doubtless will be, by hardy settlers, who will imitate the examples set them by our fellow-citizens on the broad trans-Mississippi plains. But it is especially you, my good people of the Province of Ontario, and you, dwellers in this fertile, interlacustrine plateau, who are now most earnestly entreated to begin at once the work of providing the needed shelter for yourselves, your cattle, and your crops, by planting homestead groves, shelter-hedges, wind-breaks, and shelter-belts. Do it, my friends, also, for the sake of your friend and well-wisher from over the border.

Mr. Saunders.—I desire to move a vote of thanks to our esteemed friend, Dr. Warder, for this very valuable contribution on the subject of forestry. The matter is

becoming yearly of more importance to us all. He is so well known all over the continent as an authority on the subject that not a word more need be said. I would add to the motion, "and that the paper be referred to the Executive Committee for publication."

Mr. Arnold seconded the motion, and in doing so remarked that if the recommendations of the Doctor were acted upon he would receive the thanks of the next generation.

The motion was carried.

Mr. Dempsey.—I have been a few years acquainted with Dr. Warder—have had the pleasure of meeting him a few times on occasions something like this; and I do not know—to use what may seem rather extravagant language—how any person who knew him could fail to fall in love with him. He is open-hearted; he is a man filled with information—on pomology especially; and he is willing, under all circumstances, to impart his knowledge for the benefit of others.

Mr. Gott here read the following paper :—

FRUIT ON THE TABLE.

"Quite a good many farmers have come to feel that they were not doing their family justice without placing upon their tables a bountiful dish of fruits such as the various seasons of the year afford, beginning with strawberries, and following into cherries, currants, raspberries, blackberries, grapes, apples, peaches, plums, and pears. Farmers of this class are not so numerous as they should be, nor as they will be, in our opinion, ten or twenty years hence."—*American Rural Home, June 10, 1882.*

"While there has been a marked improvement at the table of many of our farmers within the last few years there is yet much to learn. One of the greatest faults in this direction, and one which is the cause of very much illness, is the comparatively small quantity of fruit they use. It is a mistake to consider that fruit, like confectionary, is to be taken only between meals, and not to be counted in the work of sustaining life."—*London Farmer's Advocate, June, 1882.*

Such are some of the profounder utterances of the late agricultural press upon the subject of fruit as food upon the table of our country peasantry and more wealthy farmers. It is unquestionably a subject of great importance and influence in the economy and hygiene of our people. Fruit on the table in this connection is not merely a question of fruit for show or exhibition purposes, but rather is it to be understood that fruit is to be supplied our dining-halls and refreshment tables, not merely to beautify and decorate, or to please our fancy, but more substantially for food, for the full and perfect gratification of an inbred appetite and taste, for the sustenance and support of our exhausted physical forces, for medication and health, for the furthering and promoting of pure animal enjoyment and pleasures, as well as to defend us against the many dangerous and obnoxious influences to which flesh is heir. Fruit in this connection is one of those many merciful provisions of nature designed for the highest and purest enjoyments of the needy creature, man, one of those safeguards that the Creator of all has thrown around the frail human life, and one of those fertile sources of many high and noble physical pleasures. Fruit is further a fine example of the strict economies of the Designing Author of nature in His infinitely wise and merciful provisions for the furtherance and accomplishment of the supreme uses of the plant itself in its future life and continuance in being, and also in furnishing food and pleasure to the many depending sensitive creatures who daily wait upon it. In its very nature it is health-giving and pleasurable. Fruit is, in short, condensed sunshine, and just what is needed for the best uses of refined and refining as well as vulgar animalism. It is mainly composed of diluted sugars and acids, in delightful admixture held together by fine vegetable tissue, and in this diluted form is found not only to be pleasureable, but essentially necessary for the well being of the animal economy. It will be well for us to understand here that, whenever fruit is mentioned in this connection, matured and well ripened fruit must be understood. Fruit in that beautiful

tempting condition, when the internal acids are largely changed to sugars, and the whole mass of that inviting toothsome colour that engages at once the sense of sight, and is of that yielding state of softness to the sense of touch that gives assurance to the eater.

This is the condition when the forces of nature have consummated her elaborate work upon and in it so well understood by the well trained fruit-grower, and when it is alone fit for refined and refining human food. The influence of such food upon the human constitution is doubtless very great, and definitely marked. This, to us is the ambrosia and nectar that was formerly thought becoming for the dieties only to use as food, and never for ordinary mortals. The keen observer of human nature can almost readily discern at a glance the difference between the man who is in the habitual use of fruits and vegetables largely in his diet, and the man who has a large dose only of animal ingredients in his constitution. In the first case the food being select, congenial and mild, the nature manifests the benign influence of such congeniality. How different is this beautiful influence to that of the mere animal or flesh eater. By this we would not be understood to discard *in toto* all animal diet, on the contrary, we practice and most devoutly believe in a mixed diet as best and most suitable to the urgent necessities of our present economy. What we do mean is simply this, that we most firmly believe, that we, as a people, use too much of pure animal diet, and if the relishable qualities of fruit more and more entered into our daily diet, it would, in our humble opinion be better for us intellectually, physically and morally. We hold fruit in its uses to be a medicant, a corrective, a solvent; in this connection, as well also, we hold it to be a food, a tissue builder and a force producer in the human organism. Further, we believe, and would teach the use of fruit at all seasons and at all times. We believe in fresh fruit, in canned fruit, in evaporated fruit, and in preserved fruit, in jellies, in marmalades, in beverages, in cider, and in wine. We believe in its use further in the autumn and in the spring, in the summer and in the winter, and on all days and occasions in company and out of company. In short, we finally believe in the wisdom of its use thoroughly, wholly and completely. We believe, furthermore, in all fruits that are by our experience known to be good for food and pleasant to the eye, and to be desired to make us better. In this connection, we believe in strawberries of all sorts, although connoisseurs would fain have us believe that some varieties are better than others. But to us they are all good and equally to be taken with equal amounts of rich and well prepared fixings. We believe also in raspberries and blackberries, and can take them in equal doses, being also as with strawberries well-fixed. As for the kinds or colours, we have very little discerning choice so long as the true and genuine raspberry qualities are present and well developed. With our present facilities for preserving and canning these fine summer fruits we believe it is our duty to have them at all seasons of the year and in greatest abundance. We believe also in currants and gooseberries and all varieties, but not so firmly as we do those of strawberries. Our reasons for this are private, but nevertheless we believe in them. However, we most firmly believe in the free and untramelled use of the whole of the following list of superb native fruits, viz. :—Apples, pears, plums, cherries, peaches, and grapes, and these in all their endless variety of sorts and kinds. In these fine fruits is an almost endless diversity of quality, as hard and soft, as sour and sweet, as woody and melting, as strong flavoured and insipid, as buttery and as sugary, but still we believe in them. We believe they all have an appointed place to fill, a work to do, and a use to exert, and a character to sustain. Whether their origin was recent or remote, whether at home or abroad, whether in England or Ireland, or Scotland, or on the continent of the old world, whether on the continent of the new world, or in the still more stern and trying influences of Canada, wheresoever their early home may have been, we still believe in them, and welcome them. We believe also in tropical as well as temperate fruits. And those of all sorts, whether they may be called oranges or lemons, from the torrid and tropical regions of California or Florida, or whether dates or figs from the more tropical clime of the East India Islands, or whether they may be limes or bananas, we would still use them, and relish them and be thankful for them. But in our endless and varied wealth of rich and tempting fruits suitable to our condition and clime, we are most happy to say we need never covet the tropical fruit of the southern zone. Our basket of fruit is so rich, so varied, so tempting, so seasonable, so luscious and delightful. Under whatso-

ever supervision and artistic training, or delicate manipulation they may have been subjected ; we would also thankfully accept them as a blessing to mankind. Though they may have originated in the untired and patient labours of a Van-Mons of Europe, who spent a long and valuable life in the service of the delightful and buttery pear, and who started so many fine and standard varieties for the service of the world, they may be thankfully accepted. Though they may have come from under the scholarly tuition and masterly training of a Thompson, the head of the Royal Horticultural Gardens of England, or of a Dr. Lindley, or a Thomas Andrew Knight, or a Kenrick, or a still more famous, De Candolle, of Geneva, a gentleman to whose manly and masterly skill, and indefatigable labours we are so much indebted for so many improved pomological treasures ; we thankfully receive and cherish them. Though they may have come from the still more recent successful labours of a Kirtland, of Cleveland, Ohio ; a Rogers, of Salem, Mass. ; a Wilder, of Boston, Mass., whose memory is so widely and deeply cherished as a national blessing ; or a Clapp, of Boston, Mass. ; or a Miller, of Bluffton, Mo. ; or an Ellwanger and Barry, of Rochester, N.Y.; or a Downing on the Hudson, N.Y. ; or a Saunders or a Dempsey or an Arnold, of home and Canadian fame in the origin of fine table varieties of fruits, still they are most acceptable, and to be taken with devout thankfulness. They are to be received too, in all the varied and honoured names and designations they bear upon their fair faces, and by which they are severally known. These are sometimes remembrances and bring afresh to our thankful minds the noble figure or still more noble deeds of the noblest of man ; of a Knight, of a Napoleon, of a Rivers, of a Lindley, of a Kenrick, of a Cox, of a Diel, of a Knox, of an Alexander, etc., all of European fame. Still more recently, we have the names upon our fruits of men of home and continental fame, as Wilder, as Saunders, as Downing, as Madison, as Jones, as Manning, as Kirtland, as Longworth, as Elliot, as Rogers, as Talman, as Dana, as Hovey, as Ott, as Platt, as Rea, as Coe, as Coolidge, as Crawford, as Hale, as Hyslop, as Sturtevant, as Barry, as Herbert, as Houghton, as Moore, as Morton, as Allen, as Williams, as Andrews, and a host of others whose honoured memories we love to cherish.

Our earnest and best advice then to the people of this whole country, and from whatever part of the globe you may have come, to the high and to the low, to the noble and to the degraded, to the learned and to the illiterate, to the rich and to the poor, to the skilled and to the dunce, to the righteous and to the unrighteous, to the male and to the female, to the young and to the old, to the white and to the black, to the bond and to the free, without any distinction of station, or sex or colour, or creed, or politics, whosoever you may be, or whatever may be your name, USE FRUIT. Give it constantly and plentifully to yourself, whom you deeply esteem, to your wife, in whom you sincerely confide, to your son, in whom you delight, and to your daughter whom you love. Give it without stint to your man-servant and to your maid-servant, on whom you rely, to your ox and to your horse, which you so highly value, and to the stranger, whom you are bound to respect, within your gates.

Furthermore, and above all, we most devoutly believe in fruit, because it directly points us to God and leads us to think of Him as the "Giver of every good and perfect gift." This we consider to be the highest and most precious service in the whole history of our fruits.

We have thus attempted in a feeble way to show the intrinsic value of our native staple fruits, as well as all fruits soft shelled and hard shelled, and some of the reasons why they should be more generally placed upon our tables, upon our dining tables, upon our tea tables, and upon our festive boards for supberb occasions, for our use and comfort. While we are very anxious to produce good fruits for export, fruits well-fitted for the English market, we see at the same time very little good fruit placed upon the table of our peasantry, as though it was perfectly fit and proper for the Englishman to use, but not good for us. We emphatically teach the contrary; place it upon your tables in a natural state, in a prepared state, for the meal, for desert, for use, and our humble word for it, the public health and the public purse would be the gainer.

At this stage the Association adjourned till two o'clock.

Upon the President resuming the chair, Mr. Beall, Lindsay, read the following paper:

THE FRUIT GARDEN.

"What soil, and what conditions of the surface soil would best conduce to the proper development of apple trees?"

While the apple tree is being so generally and often so successfully cultivated throughout the country, it seems unnecessary to give any minute description of a suitable soil for that purpose. The general intelligence of our people has led to the establishment of the idea that land, which will produce a good crop of wheat or barley, ought to be suitable for an orchard, and in this they are mainly correct, as the cause of failure is not so much in the kind of soil selected as in the lack of knowledge as to the preparation and after treatment of the surface soil.

A large portion of the surface soil in Ontario is of a clayey formation, and is usually described as clay, clay loam, sandy loam, loamy clay, &c., but which may be described generally as calcareous clay, with a greater or less quantity of humus or vegetable admixture.

The fertility of such a soil depends largely on its physical properties, perhaps more so than on the chemical combination of its elements. In its natural state, where clay predominates—and it generally does with us—its power of cohesion is so great that it will not readily permit water to percolate through it, it has but little power to absorb moisture by capillary attraction, to absorb gases, or to retain heat. The physical properties of this soil must, therefore, be materially changed, before apple trees can make such healthy and vigorous growth as to make their cultivation remunerative.

The conditions of the soil which seem to offer the best promise of success are: first, that it shall contain the necessary combination of chemical elements, and then that the surface soil should, by mechanical means, be made incohesive, permeable, friable and mellow, to the depth of eighteen inches or two feet, and that it should be dark coloured, and also that ample provision be made by underdraining or otherwise, for the percolation and carrying off of all superfluous water, then it will readily appropriate from the atmosphere the three great desiderates of vegetable growth, air, heat and moisture. Trees planted in such a soil will have ample room for the ramification of their roots for a very long period of time, and if the soil, by mechanical means, is kept in the state indicated for eight or ten years after planting, the trees will not decay through loss of a large portion of their lower roots, by rotting in stagnant water, as is frequently the case in undrained soil.

In the spring of the year, the season of growth will commence much earlier in land so prepared. The under-drains will have carried off all superfluous water early, and therefore, its warmth will not be lessened by evaporation from the surface. On the contrary, it will be enabled to absorb and *digest* the warm spring rains and the sun's rays from two to three weeks earlier than soils left in a state of nature, or if only cultivated to the depth of a few inches. As a proof of how readily a suitably prepared soil will absorb moisture even in the early spring, I may mention that, on the 26th of April, 1880, between four and five o'clock in the afternoon, and while the thermometer stood at about 60° Fah., rain fell to the depth of 29 inches, which will be about 32 tons of water to the acre; every drop of this, which fell on a portion of my garden that had been, for some years, in a high state of cultivation, was entirely absorbed, while uncultivated land, but a few rods distant, did not absorb any perceptable portion. Here then, was a large quantity of water, heated by its passage through the atmosphere to nearly 60° Fah., passing quickly into the soil, taking with it a portion of the soluble part of the manure which had been liberally applied to its surface, thereby assisting greatly to raise the temperature of the soil to the point at which the germination of seeds and growth of rootlets commences; namely, to about 53° Fah. The next day this piece of land was sufficiently dry for working.

Colour too has much to do with the temperature of the soil, and it is easily shown that a dark soil will absorb heat and retain it much better than a light one. If two

flower pots of equal size and quality, but one white and the other black, be filled with dry calcareous clay taken from some cool place and exposed to the rays of the sun, it will be found that the temperature of the soil in the white pot will not increase more than sixteen degrees, while that in the black one will increase 24 degrees. Therefore, if the surface soil is too light in colour, it should be darkened, and this can readily be done by applying a sufficient quantity of barn-yard manure, but where such an application is not desirable, as in a young orchard, probably swamp muck might answer a better purpose.

Well cultivated and thoroughly under-drained soil will withstand our occasionally severe summer droughts much better than soil not so prepared. Perhaps it may not be generally known that a very large proportion of the moisture necessary for the support of vegetation, during the season of growth, is obtained from the subsoil. Many proofs may be given in support of this theory. One of the most obvious is the numberless springs which abound throughout the Province, at points much higher than the general level of the surrounding neighbourhood. Another proof is the fact—which may not be quite so obvious, although more satisfactory, when obtained—that, after a few days' heavy rain, subsequent to a long season of drought; water, or the subsoil saturated with water, can often be found in undrained land at a depth of two or three feet below the surface; while the rain water which had lately fallen had not penetrated the soil more than eight or ten inches. The intermediate stratum being absolutely dry, and this in places where, had an examination been made before the rain fell, the subsoil, to the depth indicated, would have shown no sign of moisture. If a supply was not obtained from this source, many of our own trees and most of our agricultural crops would have been utterly ruined during the prolonged drought of the last summer. As it is I am afraid much permanent injury may result to fruit trees in undrained soil from this cause. The tiny rootlets penetrate the earth in search of the retreating moisture during a dry season, to a much greater depth than during a wet one. When heavy rains set in, the subsoil becomes unduly saturated, and the rootlets, not having the power to retrace their steps, must of necessity remain buried in the cold, wet subsoil until late in the following summer, and before that time the roots become diseased by cold, excessive moisture, and the lack of the needed stimulants of heat, air and other gases. The poison is absorbed into the tree in early spring, generally causing permanent injury, often proving fatal to the tree.

Ten acres of land planted with healthy, well grown apple and other trees, carefully set in rich, loamy soil, overlying a calcareous gravelly clay (such as largely predominates throughout this Province), properly subsoiled to the depth of two feet, thoroughly underdrained by drains at least four feet deep, and carefully cultivated every year for seven or eight years, by growing potatoes and mangolds or other root crops will, in my opinion, from that time forth, prove to be a more profitable permanent investment than can possibly be realized from fifty acres of land devoted to any agricultural purpose whatever.

Mr. Beadle submitted the following:—

REPORT OF THE COMMITTEE ON THE SIZE OF FRUIT PACKAGES.

The difficulty which met your committee in recommending a uniform size in berry and fruit baskets, was the stock of these articles in the hands of shippers, which they, the Committee, recognise as a certain vested right. It is, therefore, decided that the date of the coming into force of the proposed regulations be deferred to some future date, to be named in the Act.

Your committee recommend that twelve imperial quarts, equal to $831\frac{1.8}{1.0.0}$ cubic inches capacity, be the standard of baskets or boxes used for shipping peaches, pears, cherries, plums, etc.; and that three half pints be the size of the berry basket for strawberries, raspberries, and other small fruits; and that the size of the apple barrel be the standard Canadian flour barrel, the dimensions of which in the bulge to be . . . . inches in diameter, the size at the ends to be . . . inches, and the length between the heads

to be . . inches—measurements to be made inside of the barrel; and that a petition be forwarded from this Association to the Legislature at Ottawa requesting that the views expressed may be carried out.

P. C. Dempsey, *Chairman.*
P. E. Bucke,
A. M. Smith,
Charles Drury.

Mr. Beall moved, seconded by Mr. Honsberger, for the adoption of the report.

Mr. Bucke.—In almost every article of commerce we have a standard of measures and weights; and as this report is going down from the Fruit Growers' Association of Ontario and not from the committee, it is as well that it should be endorsed by the Fruit Growers' Association with a view to an Act being passed on the subject similar to that which was passed when the change was made in the gallon a few years ago.

Mr. Biggar.—Twelve imperial quarts in a peach basket would be equal to the contents of a fourteen-quart basket; and it was said yesterday that a fourteen-quart basket was too large for shipping peaches if they are any way soft.

Mr. Orr.—Twelve imperial quarts would be more, I think, than a person would want to ship in one basket. The present basket containing twelve quarts is considered large enough for peaches. This is to be twelve imperial quarts; and it would probably hold more than the fourteen-quart basket.

Mr. Dempsey.—I thought the peach basket held twelve imperial quarts.

Mr. Orr.—I am not sure.

Mr. Honsberger.—I have measured them frequently; and they hold twelve imperial quarts.

Mr. Dempsey.—As chairman of that committee I have no hesitation in saying that if the basket holds twelve quarts, Winchester measure, we would be willing that it should be changed to ten quarts; but the view of the Committee was not to change the size, but to have a uniform size adopted.

The motion was adopted.

Mr. Allen submitted the following report of the committee on new fruits:—

REPORT ON NEW FRUITS FOR THE YEAR 1881.

To the Fruit Growers' Association of Ontario:

Gentlemen.—Your Committee beg leave to present the following report, compiled from sub-reports received from growers in almost every section of the Province. While we have to acknowledge the prompt courtesy of many growers in the Province who replied to our enquiries, we have to complain that many never replied at all, although we faithfully reminded them by circular of their duty in this respect. Out of two sets of circulars issued, numbering four thousand in all, which we sent to growers in every county, replies were received from one thousand one hundred and twenty-three, many of these being merely a card of acknowledgement stating that there was nothing to report. We believe, however, that a much deeper interest will henceforth be taken in reporting these matters, as our first report is now about being distributed through the Province, and growers will see the desirableness of these reports. In this report we have included fruits that are old varieties, but are being introduced either into the Province or some particular section of it.

STRAWBERRIES.

Sharpless still heads the list in the district about Toronto. The best for size and a fair cropper in Wellington, Perth, and Waterloo. Varies more in the Ottawa district than any other—some growers speak highly of it while others would not give it garden

room. At Arkona it is not considered a first-class berry by any means; its only good points are large size and solidity in the estimation of growers in this section. The best at Whitby, quite hardy. One of the most valuable in the Niagara district.

Crescent Seedling grows and bears well at Toronto. At Guelph it is a good market berry. At Arkona this is considered the coming berry for market and family use, hardy in plant, and large uniform fruit of fine flavour and good colour, carries well. One of the best at five different points in Ontario county. Highly thought of by growers in the Niagara district for its heavy fruiting quality and the fine marketable appearance of the fruit. Good at Clinton.

Jucunda does not succeed so well on heavy soils. Indeed, the reports from all sections are so varied that we do not feel inclined to give it a high character.

Captain Jack is considered a profitable market berry at Arkona, solid attractive fruit of the Wilson type in flavour. A favourite in Haldimand and Halton.

New Dominion is well spoken of in the counties of Stormont and Dundas. It is said by some there to come in a few days after Wilson's Albany, while others say it comes about the same time. Bears well and comes in after Wilson's Albany in Frontenac, but not so much thought of as regards flavour, and is softer to handle. Proves very valuable at Ottawa—large even berries, fine colour for market, and a uniformly large cropper. At Arkona it is liked, and promises to be an acquisition for market value; hardy in plant and of good character generally. At Hamilton and through the Niagara district it is looked upon as one of the most valuable varieties for a local market. Fair grower at Clinton.

Alpha (Arnold's No. 8) has done well the past season at Stratford, and in Oxford, Elgin, and Victoria counties; and in the vicinity of Prescott one grower prefers it to Wilson for quality and local market profit.

Mr. John Croil, of Aultsville, has imported from Scotland the following varieties, all of which appear to grow well, and will fruit next year: Alice Maria, Brown's Wonder, Dr. Walker, Frogmore Pine, Viscountess de Harcourt, and President.

Kentucky bears large crops at Kingston; comes in with New Dominion, and is well suited for a local market berry, coming in after several others.

Arnold's Pride (No. 23) still holds its good reputation at Ottawa for productiveness, colour, and size, and is evidently proving itself an acquisition generally over the Province. It is the finest berry we have in Huron for family use. Growers prefer it to any other for home use. At Windsor and St. Thomas it is highly spoken of, and several growers say it will ship fairly well to the city market. A good family berry at Stratford.

Cumberland Triumph is considered one of the most promising berries, resembling Crescent in some points, but some growers think it finer in flavour. Very productive and uniformly sized berries.

Windsor Chief, early, large, good colour, and fine flavour, suits well for family use but too soft to suit the market.

Glendale is liked at Arkona, Windsor, Brampton, and some parts of Wellington, Wentworth, and Waterloo for a late sort, both for family and market. Considered better than Kentucky.

Arnold's Maggie at Arkona and several parts of Huron, Perth, and Lambton is looked upon as one of the most promising of the Wilson type, and superior to that berry in both flavour and colour. Liked for family plots in Brant and Kent.

Bright Ida (Arnold's), in Lambton and Perth is said to be a large bearer and rich in flavour, giving the strongest fragrance of any variety.

Marvin is spoken of at Arkona as a promising variety.

Miner's Prolific is evidently not widely known, but generally esteemed where planted.

Bidwell is not well spoken of in Essex and Kent, but considered promising in Ontario, Wentworth, and Peel.

President Lincoln is liked at St. Catharines, Grimsby, and Drummondville, but at Peterboro', Stratford, and Sandwich they think it unnecessary while we can get Sharpless, which. taken on all points, is considered better.

Early Canada appears to be the coming berry if we judge by the reports of three of the growers in the Niagara district, who claim it to be earlier than Wilson, as good a shipper, and better in quality for table use. Four others in the same district think it no better in quality, about as good a shipper, but some days earlier. One grower says this variety will bear better than Wilson for one crop only, and that it won't pay for a second crop from the same plants.

RASPBERRIES.

Col. John McGill, of Oshawa, has a seedling black from the Doolittle—fruit smaller five or six days earlier, and sweeter than that variety.

Saunder's No. 55, sent out two years ago by the Association, is the only one that gives good promise in Ontario county. Colour is not liked as a rule, but it is a strong grower, and hardy. Mr. D. B. Hoover, of Almira, thinks it inferior to Philadelphia, although it is hardy and bears well. Colour is said to be against it for market. Has proved a strong grower and perfectly hardly at Kingston. At Arkona it has fruited and grows well, but is not placed in the front rank. Mr. J. K. Gordon, of Whitby, says it has done well with him ; is a black cap, not quite so large nor so black as Mammoth Cluster, sweet and pleasant. Has grown well and fruited, and gives satisfaction for family use in Huron.

Philadelphia is considered altogether one of the best grown in Frontenac. Good and hardy in Wellington and all counties to the south and west. Colour is against it for market value. One of the best at Clinton.

Brinkle's Orange.—Winter kills it in Frontenac, Durham, Stormont, Prescott, and parts of Ontario. Is considered a heavy bearer and of good table quality in first two mentioned counties. At Clinton is liked for its season best.

Clark is favourably reported on from Frontenac ; is hardy and productive. At Arkona it is considered the best of any for family use, productive and hardy, fine flavour, large, good colour. Liked well in Ontario county. Not always hardy at St. Catharines.

Mammoth Cluster is considered as well suited to the soil and climate of Frontenac, Victoria, and Elgin.

Mr. P. E. Bucke, of Ottawa, reports that all the seedlings raised from the Saunders' hybrid fruited well the past season. They consist of four reds, two blacks, and a white. They were not protected the past two winters, and yet appear quite free from the effects of frost. One of the reds is like its parent, an exceedingly strong grower, and, although standing in poor soil, sends up tremendous canes, which branch considerably. From this plant a large crop was picked the past season—nearly three times the crop yielded by any of the others. It does not sucker much more than a black-cap. The fruit of these plants is quite distinct in shape, and all good. The white is the weakest grower and the poorest berry. The black-caps are both prolific and strong growers ; one is very thorny, the other nearly smooth. The year before last Mr. Bucke sowed some more seeds of the Saunder's hybrid, but only two plants were obtained. They are growing well and will fruit next season. The canes of the reds are very dark in colour, and covered with stiff prickles, excepting one which is light-coloured and smooth. Doubtless, if these seedlings were taken in hand by some experienced propagator and thoroughly tested they would prove quite an acquisition to the raspberry list.

Queen of the Market is so nearly like Cuthbert that several growers do not see any object in cultivating both.

Turner is a strong grower, large fruit, firm, and of good quality. Growers at Arkona consider this the most promising berry for general cultivation. In Grey, Bruce, and Wellington it is thought highly of. Some growers would discard it on account of tendency to sucker.

Cuthbert is considered the coming red in many sections of the west and south. One of the best at Whitby. Hardy berry, good quality, fine colour, and good shipper.

Ganargua of the purple caps is said to be the best in cultivation in Lambton. The plant is hardy, and produces large crops of fine fruit. It is readily propagated by the tips.

Gregg holds its own well, and in some western counties increases in popular favour. One noted grower says of its good points: "It is later in ripening, hangs longer on the bushes, is more even in size, a little higher in flavour, and commands a higher price than Mammoth Cluster." Another grower, lost for want of strong enough words to express his views, exclaims, "It is simply immense."

Highland Hardy seems to be liked only for earliness, other qualities being against it by the evidence of all growers.

Niagara, a cross between Clark and Philadelphia; strong grower, large berry, not quite so dark in colour as Philadelphia, very productive, and a good shipper. It comes into season after Clark, which is likely to place it high in the estimation of growers generally, and its quality is superior to Philadelphia. Mr. A. M. Smith, of St. Catharines, is the originator of this variety, which we believe to be worthy of general cultivation through the Province.

Thimble Berries are reported from most of the eastern counties as very valuable for table use. They command a ready sale in all the local markets. Rank growers and regular bearers. A fine shipping fruit, and in preserving or eating raw takes little sugar. In Bruce the Germans make a very palatable wine from this berry, and the Saugeen Indians pick and ship them in large quantities to the city markets. They grow mostly in rocky bluffs and along upland pine woods, but will grow in any soil desired.

CURRANTS.

Lee's Prolific has been reported upon from almost every county in the Province, with various degrees of success. Some say without the slightest hesitation that it is only the Black Naples under a different name, but the more reliable agree that is is distinct, although some think it is no better than Naples; while others call it better in every way, a larger cropper and much finer for preserving. One grower in Peel says he can make as much at six cents per quart on Lee's as he can at ten cents per quart on Naples. He claims, as well as several others, that Lee's must be regularly manured and pruned in rder to give best results.

Saunders' Seedlings are said to be worthy of more prominence than they have yet been accorded, and we hope another year to be in a position to speak specially upon their individual merits.

GOOSEBERRIES.

In Glengarry, Stormont, Dundas, and parts of Prescott and Leeds we have reports that all gooseberries mildew so badly that growers do not care to give them further trial. Even Downing's and Houghton's seedlings have not escaped in Stormont.

Mr. Noah Sunley, of Guelph, imported fifty varieties from England, and has given them a fair trial with the following results: He finds the varieties that have shining leaves the hardiest and best croppers, and free from mildew. He finds the best varieties are *London Marigold* and *White Smith*. Those that have soft downy leaves are most liable to mildew.

Mr. J. K. Gordon, of Whitby, has a fine collection of gooseberries, including some of Mr. Roe's seedlings, and several leading English varieties. All grow well, are hardy, and

quite free from mildew. In planting he digs the holes wide and deep, and fills up with a mixture of loam and coal ashes, upon which he plants the bushes, and afterwards applies a liberal mulch of black loam, coal ashes, and manure.

Mr. James Dougall, of Windsor, has the following seedling gooseberries, which he has selected as possessing more or less merit:—

No. 1, from the seed of an English variety crossed with Houghton. Berry something larger than Houghton, oblong, deep green with light veins, quality good.

No. 2, same parentage; berry a little smaller than No. 1, almost round, green with a yellow tinge, flavour good, richer than No. 1.

No. 10, from the seed of Houghton fertilized with an English variety, oval, not quite as large as Downing and about same colour, good to very good.

Hybrid Seedling, No. 2, from the wild prickly variety crossed with an English gooseberry, oval, with a sprinkling of slender hairs, same size as Houghton, straw colour, covered with red dots, quality good.

Hybrid Seedling, No. 7, descended from the prickly wild crossed with an English berry, oval, covered with fine hair, large, dark purple, quality good to very good. Mr. Dougall believes this and the Hybrid No. 2 will become two of our most popular berries. The bushes are strong, upright growers, and not subject to mildew. They seem perfectly hardy, and bear regularly large crops.

Elderberries are becoming valuable for wine-making, and many use them for stewing into a sort of preserve, and in making pies. They are so sweet that they take very little sugar. The plant is a regular bearer of umbrella shaped clusters. The white flowering variety is generally considered better than the pink.

APRICOT.

Mr. D. B. Hoover, of Almira, has a Russian seedling, a hardy, fast grower, and good bearer.

CHERRIES.

Empress Eugenie, said to be the hardiest of any grown in Waterloo county, and a Galt grower says its fruit is much finer than Early Richmond.

Windsor, one of Mr. James Dougall's seedlings, almost black, very productive, hardy, small stone, fruit medium size, juicy and refreshing.

Mosely Favourite.—We thus name a supposed seedling fully described in our report of last year. The original tree continues to bear immense crops of very fine marketable fruit, which is bought up eagerly for preserving in Goderich. It has never shewn the slightest trace of disease in any shape, and we believe it to be hardy enough to grow anywhere in this Province.

GRAPES.

Brighton does well in Ontario county, where it is grown pretty generally. Spoken well of in York county for growth, and in Bruce, Perth, Waterloo, Wellington, Essex and Lambton for growth and hardiness. Very few complaints of killing. Considered one of the best three at Whitby. Likely to become a general favourite in the section around Arkona. Is tender at Whitby according to one grower. Promises well in Oxford; and said to be an acquisition in Elgin. Strong grower in Huron.

Burnet mildews in Ontario county, and comes in a little after Concord. Grows rampant in York, berries uneven in size, loose bunch, do not ripen evenly; but we have no complaints of mildew from that section. It seems to mildew badly all through the western parts of the Province. At the West Riding of Huron Show at Goderich the finest out-door grape upon the tables was Burnet, grown by A. M. Ross, M.P., who says it shows better so far than any grape he has. The bunches were compact and large, with

quality first class. Vigorous in growth in Frontenac, but a shy bearer; some report it as equal to Black Hamburg. Grows slowly in McGillivray township, in Middlesex; has not fruited yet, but looks healthy and hardy. From the Ottawa district we get the encouraging report that the Burnet has fully realized every anticipation of the fruit grower. They call it a "glorious variety." One grower said that the "originator deserved a monument from his country." Some growers in that section complain that in some instances the grapes, when they had attained nearly half their size, stopped growing and ripened early, but the flavour of these was perfect although they were seedless. Can some experienced grower account for this peculiarity? Is it occasioned by a want of fertility in the pollen? Burnet was winter killed at St. Catharines, and in two cases in Middlesex, one in Waterloo, three in Perth, and four in York. A prominent and intelligent grower at Whitby classes this as the poorest variety among a long list that he cultivates. He says it is better flavoured than the Champion, but its bunches are very imperfect, seeds large, skin thick and tough, very late in ripening, and so liable to mildew. He has the past fall dug up the plant and replaced it with another variety. A remarkable grower at Arkona, and fruit good. At Peterboro' it has done well and gives satisfaction in a majority of cases reported. In Oxford, Kent, Essex, Victoria, said to be a very strong grower. Has fruited satisfactorily in Northumberland, Russell, and Prince Edward counties, and one grower near Cornwall thinks it one of the best in very way he has seen.

Early Dawn is too small in bunch to be of market value, when compared with other varieties coming in the same season.

Mr. J. K. Gordon, of Whitby, is testing over fifty seedlings, mostly from Champion and Delaware. Some are very vigorous in growth and give promise of strong constitutions. They will be reported upon hereafter according to merit.

Peter Wiley.—About same form as Duchess, half shouldered, compact, large berry, slight musky flavour, and unpleasant after taste, white.

No. 1, or Downing, large bunch and very large berry, resembling Black Hamburg in form. Specimens examined were not fully ripe; colour dark to reddish. It might suit well for curing to raisins.

Mr. D. W. Beadle, of St. Catharines, has two white seedling grapes of great promise. No. 1, named *Jessica*, is medium in bunch and berry, little loose in form, very sweet, skin tough ant to chew, berries adhere well to stem, good to very good, foliage strong and vine a good grower. No. 2, large bunch and berry, shouldered, flavour not so rich as No. 1, but good. Both these give promise of value, and certainly are superior in general character to any of the new white grapes now being introduced.

Prominent among Canadian hybridists we have Mr. W. H. Mills, of "Fernhurst," Hamilton, who has done so much to bring to perfection and stimulate the hybridizing of grapes. Out of a large number he has now selected the following five, which possess more than ordinary excellence. They possess in common an entire absence from foxiness, freedom from pulp and colouring matter in their skin. They are meaty, with skin adhering to the flesh like the Bowood Muscat, apparently as hardy as our long-cultivated varieties, standing in an open three-acre garden without protection along with about fifty other varieties, among which may be found many of Rogers' hybrids, Delawares, Concords, Crevelings, Diana, Iona, Hartfords, and many others, affording the best opportunity for comparison.

Lavega, a cross between Chàsselas and Diana, red, very thin skin, medium to large, compact in cluster, larger than Diana, ripens about 1st of September, wood short jointed, foliage strong and good; one of the sweetest open air grapes we know of.

Mills, a cross between Black Hamburg and Concord, cluster large and well shouldered, berries large and black, covered with bloom, ripens with Concord, vine a strong free grower with excellent foliage.

Sultana, produced from Muscat Hamburg for male, and Creveling for female, black, very large cluster with heavy shoulder, thick skin, will keep easily until mid-winter. The

berries adhere so strongly to the cluster that a one-pound cluster may be lifted off the table by a single berry. Probably the finest shipping grape we know of; could easily be shipped to Europe. Foliage fully as strong as Concord; ripens with Concord.

Tena is probably the best of Mr. Mill's hybrids for market. It closely resembles Black Hamburg in size, colour, fruit, and flavour. Foliage light, but stands well all changes of weather; ripens with Concord. This hybrid is a cross between Muscat Hamburg and Creveling. When Mr. Mills got this variety into bearing he was so well pleased with the fruit that he gave up using under glass grapes. It is a most delicious grape.

Darwinii, white transparent, high flavoured, medium sized cluster and berry, good strong foliage, not a very strong grower, fruit with the slighest pulp which breaks down in the mouth, has but one seed. This is a cross between Bowood Muscat and Diana; ripens late, a fine table grape.

The following were exhibited at the Provincial Exhibition last fall, by growers in N.Y. State:—

Empire State, white, bunch resembling Delaware in form, berry larger, but altogether does not appear to possess character to recommend it for cultivation in the face of many better sorts.

Bacchus, a black wine grape, resembling Clinton in size and form of bunch; strong wild strain, especially in after taste.

Montgomery, very large bunch, white, skin crisp, pulp watery and melting, pleasant acid, quality fair to good.

Excelsior, red, does not appear to ripen evenly on bunch, skin breaks, flavour pleasant, sprightly, refreshing, good.

Duchess, resembling Prentiss in size and form of bunch and berry, white, flavour sweet, inclined to insipid, lacks character.

Prentiss holds its position well and will undoubtedly gain in popular favour as it becomes known. It ships well and is of that sized bunch and berry that will give it market value, while its good to very good quality will place it in favour for table use generally. Pity it does not ripen earlier and a better grower.

Jefferson did not impress us favourably the past season. While quality was good, pulp melting, skin tough, bunch and berry large, it did not appear to ripen evenly, nor come in as early as we would like for this country. But further test will show better its good and bad points.

Lady Washington, large bunch with medium berry, shouldered, flavor mild and most agreeable, a grape that one could eat a large quantity of and not tire. But it seems to have the objectionable feature of shelling, and is too late to be desirable.

Pocklington is variously reported upon. In the Niagara district opinions are oecoming more favourable, while in Essex, Middlesex, Huron, York, and some other sections it is said to be a slow, and not strong grower. We have examined the fruit from Niagara section, Whitby, Prince Edward county, and Rochester, and found it very variable. That grown by Mr. P. C. Dempsey was fine in appearance, but the berries shelled from bunch badly. Four bunches from Rochester, when received every berry was off the stems in the package. From Whitby the berries were firm on bunch. Altogether it maintains its fine appearance for size of bunch and berry, quality medium, decidedly foxy in odour, but much less so in flavour, pulp rather tough. In some cases did not appear to ripen evenly on bunch. From its fine appearance it will doubtless command a ready market for a time, but it can never be esteemed by the cultivated palate.

Albino, one of Mr. Haskins', has improved in our estimation, judging from specimens tested in September. Matures about the same time as Concord, and has proved quite hardy, foliage a good deal like Delaware, bunch large, slightly shouldered, juicy, sweet, good.

Yellow Concord (Haskins'), is a seedling of Concord crossed by Allen's Hybrid, very

prolific, hardy, thick green leaf resembling Concord somewhat, seems perfectly free from mildew, bunches medium to large, berry large, compact, pleasant acid flavour, melting, but a slightly unpleasant aftertaste by chewing the skin. It is free from the pulpiness of Concord and the foxiness of Pocklington and Niagara; and will likely take a front rank among white grapes in Canada.

Abyssinia (Haskins'), black, green stem, bunching very large, thin skin, pulp tender but not strictly melting, stem and form of bunch resembles Burnet, skin can be chewed without imparting any unpleasant flavour, quality good to very good.

Champion does not appear to gain in favour anywhere in the western parts of the Province, but is considered a good market variety in the east. At Kingston it bears well, is hardy, and forms fine bunches. But those who have tested Moore's Early in the east say that it will very soon take the place of Champion. Was ripe August 28th at Arkona the past season. Gave the third largest crop at Whitby, Isabella being largest, and Concord second. Considered too poor a quality at Clinton to be worth growing.

Eumelan is hardy in Frontenac, bears well, but bunches do not set compactly. Winter killed in Middlesex. A fine family grape in Oxford, Elgin, Essex and Peel. Considered second rate in Waterloo. Not compact enough in bunch for a market fruit in Kent and Huron.

Salem, considered one of the best grapes in Frontenac, hardy, and quality good to very good. Winter killed in Middlesex. One of the best three grapes at Whitby. The finest outdoor grape, says a grower in Brant. Mildews in Huron, Peel, Oxford, Norfolk and York.

Othello is rather late in ripening to be of value in Lanark, Renfrew and Frontenac. It has been introduced into the vineyards in France, and thought highly of for producing a red wine.

Dempsey's No. 25, white, quality good, but has not ripened uniformly well in Russell, Northumberland and Carleton. It appears to be too late to suit any of these eastern counties. Those who have fruited it and matured it perfectly report it as one of the highest flavoured outdoor grapes. Very subject to mildew in many sections.

Chasselas de Fontainebleau is being extensively cultivated in the open air at Ottawa, and ripens with Delaware. Its splendid bunches and general beauty makes it a favourite on the market, where it brings the highest price of any open air grape. It is an old foreign variety, subject to mildew in western Ontario.

Worden is considered the best of any for general good qualities at Whitby. Does well at Jordan station.

Martha is considered the finest white for vineyard purposes at Arkona; it is very hardy, good grower, large compact bunch and large berry with good flavour. Killed last winter in Ontario county and Simcoe. Does not succeed at Clinton. Is not esteemed in Brant.

Moore's Early has been fruited on the grounds of several Niagara district growers as well as some others, and the general opinion is in favour of its coming into general cultivation. Several eastern growers think it will displace Champion in popular favor, as it comes in fully as early and averages a better market size, besides being of superior quality. But from four growers we have advice to be cautious in adopting this variety, as they say it is given to crack. Medium grower and bearer at Whitby, and strong in Huron.

Mr. Charles Biggar, of Drummondville, has a fine seedling white grape of good quality, but ripens rather late to suit the northern parts of Ontario, its season being about with Isabella. Mr. Biggar has another seedling strongly resembling Delaware, but larger and a ranker grower, and it is likely to come in a little earlier. We expect upon further careful test to find this one prove of considerable value.

Lady has fallen down low in our estimation; said to be a poor grower; it certainly is poor in bunch and berry, In fact, its only good point as far as we are able yet to judge is its earliness, which, under all the circumstances, is not sufficient to compensate

for the bad qualities it has, especially in the face of other varieties coming in as early, and better in other respects.

Belinda, one of Miners' seedling white grapes, said to be a strong grower and good bearer and as early as the Concord, but cracks so badly as to unfit it for cultivation.

Senasqua has grown well in nearly all the western counties of the Province, and is said to be strong and vigorous at Belleville and Gananoque. Strong grower in Huron.

Niagara has not fallen in our esteem, but still easily holds a high position among white grapes for market. It is undoubtedly one of the hardiest grapes yet introduced, if we can judge from its great leathery foliage and the lateness in shedding. From the vineyards planted we get the highest recommendations for its thrift and hardiness, shewing that the constitution is strong. We have every assurance from growers at Lockport and those who have seen it there, that it is prolific, and certainly the bunch and berry are of a sufficiently large size to command top prices in market. In foxy flavour it resembles its parent, the Concord. A Whitby grower is testing this variety, and thinks it will prove quite hardy and a strong grower.

Carlotta, a seedling white grape, is said to be a good grower, productive, ripens with Concord, and as good in quality in every way; but it cracks badly, which destroys its usefulness for general cultivation.

PEACHES.

Mr. Isaac French, of Oshawa, has a seedling resembling Early Crawford, seems hardy and likely to become valuable for that section.

Ott's Beauty, a yellow fleshed seedling, grown by Mr. George Ott, of Arkona. It is large, good quality, and ships well. It also comes true from its own seed, and growers in that vicinity are planting extensively of it.

Early Canada is not coming up to expectations in Essex and Kent. At Arkona growers complain of it as being no better than Amsden's June, although ripening about August 5th; it is small and intensely cling. Along Lake Ontario and the Niagara River it comes in earlier, but is generally considered almost identical with Alexander, Amsden's June and Harper's Early, excepting perhaps that the latter may be somewhat better in flavour.

Charles Friers, of Clandeboye, has several very promising seedlings of considerable local value.

Seedling Peach No. 1, grown in Essex, large yellow, free stone, sweet, not very juicy, but rich and good, ripens September.

Seedling Peach No. 2, grown in Essex, under medium size, yellow, very juicy, rich and tender, pit unusually small.

In the vicinity of Beamsville there are a great many seedling peaches grown. Orchards of several hundreds can be seen there with some samples of very fine fruit. Mr. J. C. Kilborn has paid considerale attention to the growing of seedling peaches, and after many years of trial has selected three of more than ordinary excellence to propagate from.

No. 1, high coloured, yellow flesh, free stone, comes in a little before Hale's Early, above medium size, a good shipper and not subject to rot.

No. 2, very large, nearly round, high coloured cheek, deep rich yellow flesh, free stone, of high flavour, ripe about a week before Early Crawford; tree very thrifty, hardy, and a regular bearer; considered altogether the most valuable peach in this section for market. Generally the fruit has to be thinned out, so heavy does it bear; and the past season, although so dry and soil very light, specimens measured nine inches in circumference.

No. 3, yellow flesh, free stone, large, ripe ten days before Smock, good shipper. Growers in this vicinity are so favourably impressed with these seedlings that they intend

to propagate largely, more especially as they have no trace of the yellows; they are anxious to keep clear of the dread enemy.

Mr. W. C. Searle, of Clinton, has a deep yellow flesh seedling peach, hardy, fine grower. He is strongly in favour of growing none but good seedlings. He thinks the peach grafted on plum stock is best.

Mr. Gage J. Miller, of Virgil, has a seedling peach, free stone, yellow flesh, early high colour, in form resembling Early Crawford.

Mr. R. Currie, of Niagara, has a large white fleshed seedling peach, melting, but not high flavoured, resembling Late Crawford in form, comes in after Early Crawford; free stone.

Drury Seedling.—This is one of the finest peaches we have met with among the seedlings, and one that can hardly be excelled among our many well-known sorts. It is grown by Mr. C. Gamon, of Collingwood, from whom we obtained its history. Coming across from Niagara some six years ago Mr. Gamon bought a basket of fine peaches and planted five stones from these; two grew, and the Drury seedling is one of these. The tree is planted in a southern aspect, well protected from the north by a house. It has proved entirely hardy, although last year it appeared to be weakened by cutting out of season too many scions from it. The fruit, which averages larger than the Early Crawford, ripens about 14th September; high coloured, yellow flesh, free stone, rich, a splendid shipper and abundant regular bearer, tree a strong grower. The other tree has not yet borne fruit, but appears hardy. Mr. Gamon believes the only method by which peaches can be grown successfully in the colder sections of Ontario is by planting the stones and keeping the best seedlings thus produced. Many fruit growers in the Collingwood section and through Simcoe county, encouraged by Mr. Gamon's success, are trying to grow seedlings, and already we have heard of a number who will likely be able to report fruit another year. Collingwood is the farthest north point we have heard of peach growing in, and it will be interesting to prosecute our enquiries another season, and find the results of a more extended trial in that far north district. Mr. Gamon took first prize last year at the Provincial Exhibition at London with the Drury seedling.

Mr. Joseph Walker, of Virgil, has a white flesh, free stone, juicy, pleasant flavoured seedling, resembling Morris' white; it is scarlet at stone.

Early Louise is spoken well of at Arkona, Windsor, and Goderich; hardy, free grower, and fruit always saleable in market.

Wager has been fruited in Lambton, and is said to resemble Early Crawford, but comes in later. Two growers think it is the same as the Allen.

Stump the World comes in about first October; free stone, large, white flesh, juicy, good. In Oxford said to be too tender. Does not gain in esteem in Huron. Rather too late to be valuable for Niagara district.

Mr. Thomas Holloway, of Clinton, has a peach taken from the garden of the Earl of Fortesque, Devonshire, England. It is one of the strongest growers we have seen, yellow flesh, large, early, hardy. A seedling from this also is making a very strong growth; fine healthy, clean wood. We hope to give a royal report on these another season.

Allen fruited at St. Catharines the past season. It is nearly as large as Early Crawford, and ripens between that and Late Crawford; a good cropper and considered valuable.

Mr. J. K. Gordon, of Whitby, has a fine seedling, yellow flesh, free stone, large, round, and a good shipper, very small stone, bright red cheek, ripens about same time as Early Crawford, tree inclined to grow low with spreading top, seems perfectly hardy. Mr. Gordon has several other seedlings, which appear to be hardy and thrifty. By protecting from the cold north winds and the scorching sun of early spring Mr. Gordon has succeeded in fruiting several varieties of peaches that hitherto have been considered too tender for this section.

Beatrice is losing in favour among a large majority of growers on account of its

small size. When the peach crop is large Beatrice could scarcely get a bid in the market.

Briggs' Red May originated in California, about same size and quality as the Alexander, but said to be less liable to rot, and will ship some better; is being tested in several points on the lakes.

Early Rivers, although thin skinned and fine grained, is esteemed as one of the best early peaches; ripens about the middle of August—in some sections a little earlier.

Morris' White is a favourite with many growers, and some intend to plant more of it, considering it is one of the most valuable of its season for market.

Wheatland, a chance seedling, fruit large, resembling the Late Crawford in form, yellow flesh, free stone. Said to be too tender excepting for a few favoured peach growing localities.

Mr. George Cox, of Goderich township, finds nothing better for profit than his seedlings Nos. 1, 2, 3, and 4.

PLUMS.

Col. John McGill, of Oshawa, has the following seedlings of promise, culled from a large collection :—

No. 1, large, round, purple, ripens ten or eleven days before Lombard, very productive and of good quality for market, a good shipper.

No. 2 resembles Yellow-Egg in size, colour and shape, but sweeter; tree thrifty and rapid grower and good bearer.

Seedling Plum No. 1, grown by R. J. Doyle, of Owen Sound, very large, egg shaped, slightly flattened at ends, a rich purple covered with light blue bloom. It is larger than Yellow-Egg, cling stone, very rich and juicy, annual bearer, vigorous grower in clay soil, but does not appear to do well in light soil, one of the earliest to ripen; wood brittle, so that when the tree has a crop of fruit it must be carefully propped; leaf long, smooth and glossy green. This is the most valuable out of a large list of seedlings tested some fifteen years ago in that section.

Moore's Arctic fruited the past season in the grounds of Leslie & Son, of the Toronto Nurseries. It is an immense cropper, regular bearer, and from the fact that it thrives well and bears abundantly at Dominion City, Manitoba, we feel justified in pronouncing it a thorough ironclad. The puncture of the curculio was seen frequently in the fruit the past season, but it did not appear to have any effect. Possibly the vitality of the plum is such as to overcome any effect the curculio might otherwise have, for certainly in no case have we seen any evidence that the egg hatched. Further experiment will satisfy us better on this point. In quality this plum is second class, but this is sufficiently good to warrant its high market value for the colder sections of this Province. Good shipper.

Seedling Plum No. 2, grown by R. J. Doyle, of Owen Sound, medium size, round, both size and shape resembling Reine Claude De Bavay, light yellow or straw colour with white bloom, juicy and sweet. The earliest plum in this section, ripening fully two days before No. 1. It is a good annual bearer, tree a dwarfish grower, round thick head, fine wood resembling willow, leaf long and rough. It seems to thrive well on a light soil.

Among seedlings grown in the vicinity of Owen Sound we find some very promising specimens; nearly all are prolific, and a majority would bring top prices in market. Among some of the finest we observed a blue as large as Smith's Orleans, somewhat resembling Quackenboss in form, pleasant, slightly tart flavour; stone splits when fully ripe.

Another seedling about the size and form of Bingham, coloured like peach, a shy

bearer, but bears every year and comes into bearing early; tart, strong fruity flavour, good.

Another seedling, green, nearly the form and size of Green Gage; prolific, free stone, flavour rich with slight tart taste, desirable for preserving, good to very good. This one is said to come true from seed.

Mr. W. C. Searle, of Clinton, has a blue seedling, small, inclined to be dry, acid; large cropper, of the Damson family, suitable for preserving.

Hudson Gage, esteemed at Kingston for preserving; tree bears well and regularly, and the fruit always commands the top price in market.

Imperial Ottoman.—Mr. Noah Sunley, of Guelph, who has experimented so much with plums, would plant this variety for profit. It is hardy, a prolific bearer, ripens about first of August, fruit medium size, light green, covered with light bloom, tree an erect grower, fruit has a suture on one side from the stalk half way down.

Monroe Egg, esteemed by Mr. Sunley for canning, tree hardy and a good grower, good bearer, fruit medium size, yellow, ripens about 20th Sept.

Prince of Wales, a purple plum, of medium quality and generally a very light cropper, tree rather slow grower.

Belgian Purple, Mr. Sunley says is a better cropper than Lombard and more generally hardy, as fine fruit and it bears young; short jointed wood, and is not as liable to black knot as many other varieties.

Marquis of Gransby is a first quality plum, bears large crops, light purple in colour, with red cheek.

Brahy's Green Gage is a large late green plum of first quality, medium bearer, and considered one of the best dessert plums in the city market.

The last named three varieties have been fruited at Guelph with the results as noted.

Autumn Gage, tree strong grower, spreading top, fruit medium size, yellow, covered with white bloom. Promises well at Guelph and in Essex and Huron.

Kirke's, a medium grower, hardy, fruit medium size, dark purple, dotted with yellow, covered with a heavy blue bloom, ripe about first September. Promises well in Guelph and Huron.

Black Diamond is grown at Guelph and near Windsor, and is said to be a good grower and hardy. Only a cooker.

Prince Englebert, tree a fine healthy, rapid grower, and a great bearer; deep purple fruit covered with brown dots, quality good, a very good preserving plum and valuable for dessert. It is grown and fruited regularly near Goderich, and being introduced at Guelph and around Hamilton and Brantford.

Pershore is being grown at Guelph and will be fruited next season likely. It grows well and promises fairly well.

Penobscot, reported from Glengarry as a strong, hardy grower and regular bearer, fruit large yellow with slight colouring in cheek, a good market variety, ripens about first September.

Glass's Seedling is reported from nearly all sections as a good grower and hardy, but in some sections it has not proved a heavy cropper. In the Guelph district it has not given a large crop yet. Nearly all unite in saying that it is a desirable variety. At Ottawa it blossomed two years; the first year it proved abortive, but the past season it gave a fair crop of fine fruit. One grower had finer specimens than he had seen anywhere in Ontario. The tree stands the climate well, and if the fruit spurs are able to resist the cold it will be an acquisition of the first importance in this section. One grower thinks so highly of it that he will largely propagate from it. In Huron it is one of the best in general good points.

Greenfield, about the size of an average Lombard, yellow covered with bright crimson, suture shallow, form roundish oval, stalk about an inch long, slender, set in a narrow cavity, flesh yellow, coarse grained, juicy with a tinge of acid, free stone, a splendid cooker. This variety maintains its character for hardiness and its wonderful ability to bear heavy crops regularly, every twig and branch being fairly loaded down. It has proved quite hardy, so that we have little doubt but it will thrive well in all the eastern counties, and we believe it may be found suited to the soil and climate of Muskoka.

Goderich fruits regularly, holds its reputation as the finest plum in that section. The old tree has never shown any signs of black knot; is a strong, clean, rapid grower, with very large strong foliage.

Seedling, a small, yellow seedling at Owen Sound, about the size of the black Damson, is esteemed for cooking. The tree has a low branching head and small fine foliage, resembling that of the common wild willow.

PEARS.

Col. John McGill, of Oshawa, has the following seedlings:—

No. 1, medium size, tree hardy and a good grower, has been bearing regularly for twenty-five years, and has never shewn any inclination to blight, quality good.

No. 2, a seedling from Flemish Beauty, and resembling that variety closely in size and shape as well as in colour.

No. 3, resembling the Glout Morceau in shape, size and colour; October.

Clapp's Favourite is doing well in Ontario county. In Middlesex and Kent it has done much to encourage a taste for pear growing. Those who used to contend that it took a lifetime to get a pear tree into fruit are now loud in praises for this variety, which comes into bearing early. Fruit spots and cracks badly in some sections in cold stiff soil, but in lighter loams and where land is well drained it gives fine clean fruit. Very well suited to soil and climate of Frontenac. At Galt is placed next to Flemish Beauty for hardiness, and when fruit picked early will keep better. Called one of the best in Paisley in Bruce county, and two Perth growers would rather part with any other two varities they have than this. One grower at Whitby calls it decidedly tender, and adds that it succeeds better as a dwarf. In Lambton three growers call it the next best to Bartlett, and one grower would not plant it as he cannot get it in good condition. At Ingersoll it has given satisfaction. Has done well in Simcoe and Grey, and fair in Brant. Succeeds well in Hamilton.

General Totleben, a good hardy heavy bearer, and long keeper in York. Only good for cooking in Middlesex. Does not seem to mature properly in Haldimand.

Mr. Gage Miller, of Virgil, has a seedling pear strongly resembling Louise Bonne de Jersey in size, form and colour, winter, tree a rank grower and heavy bearer.

Mr. P. C. Dempsey has a seedling winter pear of best quality; tree regular heavy bearer and strong grower; fruit medium size, resembling Lawrence in form.

The same grower has a seedling from White Doyenne crossed with Josephine de Malines, melting and luscious, size and form resembling Dearborn seedling, quality almost equal to Seckel.

Mr. D. Shoff, of McGillivray, has about sixty seedling pear trees, some of which he will test as seedlings, while upon others he intends to experiment; he buds the top, allowing the trunk wood to grow, believing that it will prove hardier against blight than a graft would. We will have the benefit of these experiments another season.

Souvenir du Congres of no value for general cultivation, being too tender excepting for a few favoured positions in warm soils. Through the Niagara district and along the

shores of Erie and Huron it thrives fairly well. One reliable grower in York reports a sample measuring one foot in circumference ; he says this variety is not sweet enough to be valuable.

Rutter.—One Welland grower calls this one of the best October pears. Has not fruited in Essex, but grows well. Grows and fruits well at Paris.

President Druard is being tried in Essex and has grown well, seems hardy enough.

Doyenne du Comice is grown in Prince Edward County, quality good, seems a desirable pear for October, and we would like to see it tested in other sections.

Sugar Pear, a seedling grown in Essex, and locally known as the sugar pear ; it is of medium size, roundish oblate, yellow, slightly russet with carmine cheek, flesh a rich yellow, tender, juicy, rich ; ripens last of August.

Mr. J. D Lutz, of Stony Creek, has a seedling pear, winter or late fall, will average about as large as Duchess, and partakes partly of the form of that pear, and partly that of Flemish Beauty, deep eye, small straight stem set in a basin of irregular form, spotted russet all over—good.

Mr. Joseph Walker, of Virgil, winter seedling pear resembling Louise Bonne de Jersey in form ; long medium size stem set on a corrugated surface, crisp, but rather inclined to be dry.

Mr. Thos. Mills, of White Oak, small light green fall pear, long thick stem, juicy, pleasant, good.

Beamish originated at Cataraqui, near Kingston, said to be very hardy, thrifty grower, good bearer, and held locally in high estimation for good quality.

Goodale, highly esteemed in Essex, some growers place it at the head of the list. In Frontenac it has not fruited, but is hearty and vigorous. In Niagara, Huron, and Lambton it gives much satisfaction. In Brant highly esteemed. This variety was sent out by this Association.

Toronto Belle.—We tested the fruit late in December and found it in grand condition ; in quality it is equal to Beurre Bosc, and almost identical in form and colour. The tree is a slow grower, but a heavy and regular bearer. This is without doubt the finest winter pear we know of, opening, as it does, a new era in the quality of winter pears.

Flemish Beauty is planted more generally in Frontenac and several eastern counties than any other variety, it proves hardy and a good bearer, fruit clean and free from spots, brings high prices on all local markets. At Toronto it spots and cracks so badly that it is hard to get good samples. A fine healthy tree, rapid grower and heavy regular bearer in Huron. Does well in Bruce and Grey. The best, only for liability to blight, says a Perth grower. Always reliable, says a Waterloo authority. Only for this variety my pear orchard would not pay for the care bestowed upon it, says a Brant grower. My Flemish Beauties always bring the top price at St. Mary's, says a Perth grower. What a pity it is so subject to blight seems to be the almost universal wail. This variety was sent out by the Fruit Growers' Association.

APPLES.

Col. John McGill, of Oshawa, has the following seedling apples :

No. 1, a small russet resembling the Pomme Gris in size and shape, but of a bright cinnamon colour ; tree thrifty good grower and heavy bearer, fruit keeps well, and in good eating season from May to June, quality good.

No. 2, large green, medium quality, December to February, tree hardy and good grower.

No. 3, a large russet with blushed cheek on sunny side ; tree good grower, very productive, January to March.

No. 4, medium sized russet on a green surface, very productive, strong grower, May to July.

Ontario has done well so far in Ontario County, some instances of fruiting there. In Huron it has fruited in several instances, and we find no dead trees in any of the western counties, but on the contrary the general report is highly satisfactory. Does not seem to make wood as rapidly at Kingston as elsewhere, but it appears hardy. At Ottawa it killed to the ground last winter, while in a couple of instances in Russel County it has not been injured, although its growth is slow. In Oxford, Elgin, Middlesex and Kent we have several reports of its fruiting satisfactorily. Sufficient has been the evidence to prove it early, as a bearer, which is important and doubtless the chief object of the cross at first.

Princess Louise, a seedling from Fameuse, grown by Mr. C. E. Wolverton, of Grimsby; it is fully as handsome and showy as that famous variety, and it has not yet shown any disposition to spot, besides it is a much longer keeper and as good in quality. This apple was named at the winter meeting of the Association in Hamilton some three years ago, when it was examined and considered of more than ordinary value. If it continues free from spotting it might well take the place of Fameuse, which spots badly all over Ontario.

Mr. John McLean, of Owen Sound, has a seedling summer apple, white ground with flushed cheek, round, close eye, white flesh, sprightly, sub-acid, fair.

Mr. J. B. Walker, of Grimsby, seedling apple, green flesh, russet, deep eye, ribbed, medium size, flavour medium, winter.

Prenyea, from Prince Edward County, esteemed in local markets as a late fall dessert apple, sweet, lacks character to entitle it to more general cultivation.

Mr. J. Adair, of Lambeth, has a tart fall seedling resembling Jeffries in size and form, but inferior in quality.

Beauty (Arnold's), has suffered slightly by winter killing at Ottawa, but has not suffered much in other eastern sections. Is liked in Halton by three growers.

Alexander Robertson, of Verulum township, Victoria, has a seedling apple about size of Snow, marked about stem like Swaar, ribbed, corrugated about eye, flavour good, sprightly, juicy, colour green, with slight blush, winter.

Whitney Crab, No. 20, fruited in the Toronto Nurseries the past season, about shape and nearly the size of Wagner, striped, flesh yellowish, crisp, good table apple for cold sections, a good cooker and preserver. For the North-West and Muskoka sections we fancy this apple may be a great acquisition.

Mr. Wiggington, of Goderich Township, has a seedling fall apple, medium size, yellow with bright crimson surface extending well over, fine grain, white flesh, oblong, small stem, close eye, flavour partakes a good deal of Famuese, sprightly, good.

Mrs. Saunders, of Owen Sound, has a seedling apple, yellow ground with flushed cheek, deep open eye, flattened and somewhat resembling Maiden's Blush; tree, an upright even grower, fruit of even medium size, will keep till March, and a fine shipper; quality fair to good.

Mr. Wm. Brown, of Owen Sound, has a seedling russet strongly resembling the Rox. Russet in size, form and quality, close eye, deep, smooth, small core, a good keeper and fine shipper.

Mr. Brown has another seedling resembling Grimes' Golden, which evidently keeps well, as specimens of the crop of 1880 were in fair condition last August, although the flavour and general character could not be discovered.

Hastings.—A local apple, hardy and suitable to cold districts. Esteemed in Hastings County, said to be a fine shipper; productive.

Haas is considered one of the best in the Whitby district for profit. At Galt it is one of the best three for hardiness. Has fruited at Cornwall and gives promise of

being one of the best for that section. Considered a good cooker and handsome at Hamilton.

Perry Russet is reported as a good grower, and seems quite hardy in Essex. Considered of little value in Oxford, compared with the other russets, which all keep better.

Walbridge is reported from one grower in Essex, as having been planted largely in that county, but he does not think it will prove a strong grower. Good grower at Hamilton.

Utter's Red is being grown in Essex, but has not borne yet. It is a western apple, but not likely to prove better than many already grown covering same season, November and December.

Wealthy is referred to favourably from several growers in Russell, Carleton and Glengarry as hardy and valuable. A fine, strong grower in Haldimand.

Ben Davis is gaining in popularity, finding its way very generally through the Province; is looked upon as very hardy, and fine shipper for British markets.

Grimes' Golden is highly spoken of in Essex and parts of Middlesex, also in Huron. Major Murray, of Clinton, thinks this one of the best apples on the list, both in flavour and for the dessert table. Vigorous grower and good bearer in Frontenac and Carleton. Several growers in Brant and Norfolk say it is valuable, and must continue to grow in popularity for dessert.

Tetofsky does not altogether hold its own in popular favour, owing mostly to the fact, as reported from almost every point where it is grown, that it drops its fruit badly before maturing. At Arkona it was ripe August 8th. Called a slow grower at Whitby and Walkerton. Too small for its season in Norfolk. Does best in heavy soils.

Ella (Arnold's), is doing well in Northumberland, Russell, and at Ottawa, although in some instances it has been affected by the frost of last winter. Only a medium grower.

Seedling Apple grown near Kingsville, yellow, covered with bright red, conical; flesh yellow, firm, tender, juicy, crisp, with a sweetish sub-acid flavour; rather under medium size; keeps till July when it commands a high price in local markets.

Mr. D. B. Hoover, of Almira, has the following seedlings:

No. 1, medium size, summer, striped with red, flavour slightly acid; good.

No. 2, medium size, late fall, yellow, with spots of russet and sometimes blushed cheek, keeps till the new year, flavour mild and pleasant.

No. 3, rather under medium size, winter, a fine bright red, white flesh, crisp, juicy, sub-acid, and a fine keeper.

Hoover's Favourite, supposed to be a seedling, large, pale yellow with red cheek, juicy, white flesh, slightly acid, abundant bearer, hardy, good to very good, good keeper and would ship well, a first-class winter fruit.

Mann is gaining in popularity, where it has been brought up, for foreign shipping. In the vicinity of Arkona it is held in estimation for its good shipping qualities, as well as being a good keeper. Is reported from seven western counties as likely to take the place of R. I. Greening. Is growing in favour in British markets. Some complain that it drops badly from the tree.

Smith's Cider is grown at Arkona, and considered an acquisition.

Dora (Arnold's), killed to the ground at Ottawa last winter.

Lord Suffield at Cherrydale Farm in Huron, is a splendid cooking fruit, tree hardy and a good bearer.

Grand Sultan, a foreign variety, large, conical, almost white ground with streaks of red, flesh white, crisp, juicy, sub-acid, medium quality. A large cropper and free growing tree, ripens about 10th August. It does not appear to be grown excepting in Prince Edward County and Huron.

Grand Duke Constantine, a foreign variety about same form as Grand Sultan, richly

striped and splashed with red on a straw coloured ground, and covered with gray dots, flesh white, juicy, sub-acid, pleasant. Grown in Prince Edward County.

Taylor Fish, at Cherrydale Farm, in Huron, is considered the best large fall apple grown there; it clings well to the tree, and is considered the best for cooking in any shape. It is a regular, heavy cropper, and the tree a strong grower and hardy.

Baxter's Red, which originated in the vicinity of Brockville, is esteemed for hardiness and productiveness. It is being planted in Renfrew, and likely to prove valuable as a local fruit.

Mr. W. W. Austin, of Oxford, should propagate from his fine russet, which proves a fine grower and large cropper. It is certainly the handsomest russet on the lists, and one that would strike the fancy of consumers in Britain for the dessert table. In flavour and keeping it is fully as good as the American Golden Russet, and much handsomer in form.

An apple grown near Fonthill, and brought to the notice of this Committee by Mr. E. Morris, supposed to be a seedling. He says the tree is an upright medium grower. Fruit, green, covered with russet spots, about size and shape of a Rox. Russet, flavour slightly sub-acid, somewhat peculiar, but pleasant and juicy; winter.

DISTRICT OF ALGOMA.

We have several reports from this district which may be of interest to fruit growers. Several of the first residents are enthusiastic horticulturists, and are determined to make a thorough test of the various fruits. Although they have year after year lost many trees by the severe winters they try again with a new lot of varieties, determined to find something that will grow and bear. One grower located on the north shore of the Georgian Bay, about forty miles east of Bruce Mines, says his first lot of trees were lost entirely, but he has another lot that are doing finely up to the present time. They have all ripened wood, and appear as if they will come through the winter safely. He finds it an advantage to nip off the tops of the new wood about the tenth of September, so as to secure perfect ripening of new wood on most varieties. The Alexander and Duchess appear to be perfectly hardy, and require no such precaution. Last winter was the severest known for many years, the mercury indicating 37° below zero. A great majority of the apple trees planted back of Bruce Mines were killed to the ground. There is a local seedling apple which has borne fruit regularly for six years on a farm exposed to the lake winds. The Glass Seedling plum is growing well on the farm of a Mr. Robertson back of the mines, and it is exposed to the severest lake storms. The same gentleman has a Clinton grape vine which is healthy and bearing large crops yearly. All over this section there are crab apple trees hardy and bearing regularly. Mr. W. Warnock, one of the most enthusiastic horticulturists in this section, has a large number of seedling apple trees which appear quite healthy. He intends to graft most of them next spring, and will be glad to try any cuttings of good and hardy kinds that fruit growers in more favoured latitudes may favour him with. There is a long list of wild fruits all over this district of more or less value, such as plums, cherries, raspberries, blueberries, cranberries, gooseberries, black currants and strawberries. Strawberries and blueberries are plentiful along bluffs, and wherever fires have burned off the timber. All along the coast large crops of cranberries are gathered every year on the marsh lands, those near the lake being always the best. Raspberries are a sure crop every year, and of much finer quality as well as much larger berry, than those found wild here.

Plums succeed well in the vicinity of Bruce Mines.

On the Manitoulin and St. Joseph Islands any of our hardy varieties of apples will grow and bear well, and are being tried pretty generally there in small lots. Early Amber Cane seed sowed on June 2nd, was nine feet high when the first frost came; it was not ripe then, but by sowing earlier it can easily be ripened before the early frost.

Mr. Thomas McCullogh, of Korah township, near Sault Ste. Marie, has done considerable to encourage fruit growing in this section. He has a seedling from Fameuse

that has fruited the past six years; the fruit is medium size and of good quality, ripe in September, will keep well only about six weeks. He has also a number of seedling plums, but the fruit is little better than wild. The wild fruits in this section are plums, cherries, gooseberries, currants, raspberries, blackberries and cranberries. The blackberries ripens once in about six or seven years, gooseberries only bear every third year to amount to anything worth while. Black and red currants, raspberries and strawberries, bear well every year. The forest trees as a rule only bear seed once in three or four years. In 1879 a large number of fruit trees were planted in this section, but the winter of 1880 killed them all, and since then the settlers have been so discouraged that they are not inclined to make further test unless through the advice of the Fruit Growers' Association as to proper varieties. One gentleman tells us there is no use in attempting to grow anything in the Apple line excepting Siberian Crabs. But Mr. McCullogh has had stronger faith, and thus far, at least, fortune smiles upon him. Out of 200 apples, six pears, twenty plums, and two cherries planted, he only lost four trees last winter. As a rule, he believes the trees sent out there are too large. The trees he planted were one year old, and he believes they would have done better had he cut them back in the fall, as he thinks the first winter's trial with young trees is having too much wood above the snow line for the roots to support. He found a great many of them killed about a foot from the top. Last winter was exceptionally severe however, and it was preceded by a very wet fall, which, he claims accounts for the loss more than anything else. His experience is that when there is a very wet fall the sap is much weaker, and hence the trees are unable to stand an extreme frost. He says that in a wet year it takes 100 barrels of sap to produce as much sugar as sixty barrels will produce in a dry year. Through that entire section the first necessary step is to secure as dry a piece of land as possible, and thoroughly underdrain it before planting. Both forest and orchard trees suffer from sun scalding badly where the soil is wet, but this is rarely seen on dry spots. Three parties report a fair to good crop of Clinton grapes well ripened the past season.

In the district around Blind River and Bruce Mines the frost sets in about the last of September or first of October, and the late spring frosts is about the seventh of June. The soil generally through this section is a sandy loam. All along the Mississaga valley the soil is well suited to fruit growing. Along the valley the wild fruits are a sure crop every year, but the difficulty is to find a market for them. The Indians sell a large quantity of cranberries every year at about an average of five dollars per barrel, and there appears to be a good demand for all that can be grown. The sample is said to be much finer than any generally grown through the old settled portions of Ontario. Huckleberries and blueberries also find their way to the lake port towns and cities pretty freely. Along the river bottoms there are as fine cranberry lands as any one could desire, where the water advantages for flooding are perfect; and with very little capital large crops could be reaped every year. These wild cranberries are superior to the famous New Jersey and Wisconsin berries.

Signed on behalf of the Committee,

ALEX. D. ALLEN, *Chairmvn.*

STRAWBERRIES

MR. GOTT, in introducing a discussion on the question, "Which varieties of Strawberries are the most profitable for the market?" said this was a very difficult question to discuss, and a far more difficult question to settle. There are some good varieties, however; the old Wilson's Albany perhaps stands at the head of the list of good varieties—profitable varieties. Not to say that it is a variety of the highest quality, but it has the most money value in it. It is the best known of all the family of strawberries by the people of this country. They are thoroughly acquainted with it, and know how to grow it. The Crescent Seedling is apparently a new variety, but a variety of great promise. Its fruit is not so hard as that of Wilson's Albany. It is large, and the berries are pretty uniform in size, and readily command a market. The Cumberland Triumph is similar in most respects to the Crescent Seedling, and the New Dominion is one of the same class of

berries. Both are profitable. The Triumph de Gand and the Colonel Cheeny are old berries, but they are profitable. Two new strawberries, by Mr. Arnold, called his Pride and his Bright Ida, are also profitable. They are very fine fruit too. The Glendale and Bidwell are comparatively new, but what is known of them is very favourable. They are very fine in fruit and in flavour. The Sharpless is pretty well known. It is of large size, and is considered to have some good qualities. It is not a profitable variety for the market. The Kentucky is a good variety, coming later than the varieties I have mentioned. It is not a very heavy bearer, but with good cultivation it will pay abundantly for the trouble. It commands a good price in the market, being the last with us on the list. I think I have gone over the most profitable varieties that we are acquainted with.

Mr. A. M. Smith.—I do not grow many strawberries for market. I grow more for testing varieties and raising the plants. If you want my opinion on the different varieties, of course I am willing to give it. If you want the varieties that have paid best during the last year in our locality, as far as I know the first has been the Early Canada. It has been the most profitable of any that I have seen or heard reports from. The next two that I have fruited have been the New Dominion and the Sharpless. The Crescent Seedling has paid very well. I have a good many new varieties that I have just tested for one year. I have not grown them for market. Some of them are very promising. I have three or four varieties of our friend Arnold's, that as far as quantity is concerned, and as far as appearance goes—and that is what generally takes in the market—I should judge would be very profitable market berries for not very distant markets. The most of them are a little too soft for shipping long distances. I have lost the names of some of them. The most promising are what he calls Arnold's Pride and the Bright Ida. The Glendale would, I should judge, be quite profitable for a late strawberry. It ripens about the time of the Kentucky, and is a little improvement on that variety. If I were going to select about four varieties, I would select the Early Canada, one of Mr. Arnold's, the Dominion, and the Sharpless. For market they would stretch the season through.

Mr. Gott.—Which of Mr. Arnold's would you prefer?

Mr. A. M. Smith.—Arnold's Pride as far as I have tested it.

Mr. Honsberger.—I am not a very extensive grower of strawberries; yet I have grown quite a number of varieties, and as I am compelled to grow them for profit I have dispensed with endeavouring to experiment, because I could not afford it. The earliest I had was the Herculean. That was a good berry if parties did not care much about size. It was a nice flavoured berry. Then came the Wilson's Albany, which was the standard with me until the past year. Then I grew the New Dominion and the Captain Jack, the Jucunda, the Triumph de Gand, which was a nice flavoured berry if not allowed to over-ripen, and the Kentucky. The Colonel Cheeny for a time grew very well with me, though not of late years. The New Dominion I grew very extensively, and found it to pay very well; but up to the last year I kept discarding one after another, and after picking my strawberry crop of last season I turned under the last of them but one. The last one I turned under was the Wilson's Albany. Now I have none but the Early Canada. Yet I would not propose for market to confine myself to that one variety. I would take the Early Canada, and the New Dominion for late. Those two I should confine myself to for profit. I have not fruited the Sharpless or Crescent Seedling, but I have seen them fruit to my perfect satisfaction.

Mr. A. M. Smith.—I was going to ask Mr. Honsberger the time of ripening of the Early Canada, as compared with the Wilson.

Mr. Honsberger.—I planted them on the same ground and gave them the same treatment, and found that we picked the Early Canada at least six or seven days before the Wilson's Albany. My pickers were beginning to complain, thinking they were never going to get done picking it.

Mr. Dempsey.—How many thousand quarts would it produce to the acre under good culture?

Mr. Honsberger.—It depends a good deal on how far the rows are apart. I had just about an acre of ground planted with the Early Canada. I had the strawberries planted between peach and apple trees. I had something over four thousand quarts this year.

Mr. Wellington.—I grow all the different varieties, mostly for the plants. Of course we fruit them all, and have considerable fruit each year on our grounds. If I were going to plant them as an amatuer I would put down the Sharpless. The New Dominion I believe to be one of the best strawberries we have, as is also the Cumberland Triumph. I would cultivate the Monarch for my own use; but it is useless for the market on account of its not ripening or colouring at the point. To my taste it is good however. The Bidwell is another berry that I think will come into general favour. Of course it has not been thoroughly tested yet. The Crescent Seedling is an enormous cropper, but to my taste it is inferior in flavour, and of course not good for shipping. I suppose, for shipping purposes alone, or for productiveness, the old Wilson has not as yet been superseded.

Mr. Morris.—One of the most profitable berries among the common varieties is, I think, Captain Jack. I believe it will outyield any of them; and it will ship quite as well as the Wilson, keeping its colour longer. The Wilson, the Captain Jack, and the Crescent, are, I think, the most profitable to grow for money. I have great faith in this New Dominion. I have given a very large order for plants of it.

A Member.—I would like to ask any gentleman to say how Canada and the New Dominion are with regard to fertilizing.

Mr. Arnold.—The New Dominion is quite perfect—needs no other variety with it. I cannot speak of the Early Canada.

Mr. Honsberger.—I came to the conclusion that the Early Canada was very productive.

Mr. Arnold.—I would say a word in favour of Mary Fletcher. If you have not cultivated the Mary Fletcher you do not, I was going to say, know what a good strawberry is. It is decidedly the best strawberry grown. This variety was sent to me from Nova Scotia. I had little faith in it at first; the climate did not seem to suit it, but for several years past it has been one of the finest growers we have. It bears a first-class crop; perhaps not equal to the Wilson sometimes, but no one would take the Wilson strawberry after tasting the Mary Fletcher, if they could get the Mary Fletcher. It is not very large, but it is delicious. The Sharpless has been a failure with me. One of the finest old varieties that I rember is the Nicanor. That is, for flavour, but it never looks ripe; it is always white on the tips, and you take it to market, and people will sometimes tell you it is not ripe. The old Hooker has also a fine flavour. I have raised several thousand seedlings, and even in my own family we did not agree with regard to them. My wife selected one as the best, one of my daughters selected another as the best, and I selected a third as the best. The Alpha, I believe to be one of the best when planted on sandy soil; and it is a good shipping berry. Maggie and Bright Ida are not such good shipping berries, but for the market they could not be beaten. The one I named after myself could not be beaten in flavour, though it has a peculiar flavour which some might not like

Mr. Woodward.—I have a friend in Hartford, Connecticut, who produces the most startling results with the Sharpless of any berry I know. He is a very good cultivator, and manures very highly. He has been producing two quarts to the vine. I have been doing the same in my garden, and they are getting on remarkably. I am manuring with bonedust and ashes. I have received a letter from this gentleman, and he says some of the berries have gone considerably over two quarts to the single vine during the season.

Mr. Bucke.—The two strawberries that we hear the most of in Ottawa are Mr. Arnold's 23—I believe it is called Arnold's Pride—and the New Dominion. Sharpless has done very fairly; but the berries are not uniform in size. Some people like it very well. I do not think it yields so good a crop with us as either Arnold's Pride or the New Dominion. I went to work, some years ago, when I commenced to grow strawberries, and manured them very heavily, and I found I got more leaves than berries. I put on barnyard manure.

Mr. Beall.—We grow nothing but Wilson's Albany. We cannot find anything else that will pay as well, and it is always a certain crop. It never fails with us.

Mr. Willard.—When the New Dominion was first brought out Mr. Smith sent me some plants. I set them out and continued to cultivate them, and we like them very

much. I have also sent them out beyond the Mississippi. A gentleman who was on my ground and saw some of the fruit said if he could have such berries in Philadelphia he could get a fine price for them. He said that they were the finest berries he had seen. I think I have twenty-five different varieties growing there, and I do not know any better among them. Some strawberries seem better adapted for one kind of soil, and some for another.

Mr. Dempsey.—I have been cultivating strawberries for a few years, and I have tested quite a large number of varieties during the time. I have never, however, propagated plants for sale. My experience has been in obtaining the fruit, and in endeavouring to make the most money possible out of it. So far I have found the most profitable variety that I have cultivated has been the Crescent Seedling and Wilson's Albany, when we cultivated to any extent. The Crescent Seedling produced a very fine crop this year, and we took the last picking of it with the first picking of the Wilson's Albany. When I came to look over my receipts at the end of the season I found that not only had the Crescent Seedling been profitable, but that it had commanded in the market about fifty per cent. more than Wilson's Albany, taking the crop into consideration. They went into the market earlier, and consequently brought a higher price this year. Last year I did not discover so much difference in the two varieties. Captain Jack was very fine with us this year, and very prolific. This New Dominion I have been cultivating ever since the first year it was sent out, and I have never had one good crop off it in that time. I keep trying it on different soils, hoping I may strike a soil that is something like its native home. It was on the soil that I saw Mr. Biggar cultivating it that I got the most successful results from it. The Sharpless we failed to get any satisfaction from when we first planted it, because we were too anxious to get big strawberries. We placed it on land that was very strongly manured with stable manure, and the consequence was that we got leaves and not fruit. We planted it then on light land manured with ashes and bone dust, and that appears to produce berries and very little foliage. We had some land that was manured with stable manure, but did not have the bone dust and ashes ; we also had land that was manured with the bone dust and ashes only, and while the average per acre on the one was 6,000 quarts of Wilson's Albany, upon the other it was only 2,000, with the same variety of berry and the same cultivation. I find that the difference in productiveness a great deal more than pays for the bone dust and ashes. They cost a great deal less than stable manure with us. This test was on two blocks of two acres each. We have several new varieties. In fact, about every new variety that we hear of we try. When we went to pick the first of Arnold's Pride that were ripe a person who was with me said, "Why, we can pick those berries with a scoop." The first time we picked them we took as many quarts from the block as we had set plants. They had been set two feet apart and had been allowed to have runners, and every two feet we found a quart of berries. How much was picked during the season it would be impossible for me to tell, from the fact that our experimental grounds are all open to the public, and everybody wants to take away some specimen berries to show their friends. I believe there is money in the Sharpless. Any strawberry that will pay to grow for market it will pay the amateur to grow. I believe there is money also in the Arnold's Pride, but I believe there is more money in the Crescent Seedling and in the Wilson's Albany than in any other. They ship in good order. I have found no difficulty in shipping the Crescent seedling to Montreal, so I would have no hesitation in shipping them on account of their being a little soft. I did not ship any of Arnold's Pride ; I had none to ship.

Mr. Page submitted the Report of the Committee on Vegetables, as follows :—

VEGETABLES.

Your Committee to whom was assigned the duty of collecting information on vegetables submit the following as a result of their work :—

Under the name of vegetable comes a large number of valuable articles of food, and

to refer to all would be a herculean task. We may say, however, that we have given some thought and study to the general subject, and will present our considerations in as concise a manner as possible.

The past season was one of unusual heat and drought, both of which are much against the development of growth and quality in most kinds of vegetables. Potatoes, one of the leading vegetables, are a very short crop and the tubers small—this will apply to most sections of the Province—the hot, dry weather not only being against their growth, but the tops being thus slight and of slow growth were an easy prey to the bug, which in some of the eastern counties was much worse than ever before; while in the western sections of the Province, probably due to a more determined fight against their ravages, have not done as much harm as usual. The general method of destruction is by applying Paris Green mixed with plaster. The Committee of last year reported quite fully upon the many varieties; we shall therefore only refer to a few of the newest. Among the first of the new varieties stands the Beauty of Hebron, which for earliness, yield and quality is unsurpassed. The White Elephant and St. Patrick have, where tried, proved of good quality and productive. From reports gathered by the *Canadian Farmer*, we find the Early Rose and the Early Vermont to be leading early varieties, although the Rose in many sections is running out. From the same source we find the average yield last year to have been less than 100 bushels to the acre. Many fields scarcely returned the seed, while some were not dug at all. We recommend from the first to the middle of June as the best time to plant for general crop, while early potatoes should be in the ground as early as possible in the spring. Referring to some other leading vegetables, first:—

Asparagus.—This is but little grown except in certain sections, and not very good success has attended its cultivation in Ontario.

Beans, Early.—Newington Wonder and Black Butter are good. The Golden Wax is a decided improvement on the old kinds.

Beets.—The flat Egyptian commend themselves for earliness; they keep good till late in the season. Early Bassano and Blood Turnip are good in their season. It is difficult to obtain fine seed of the long Blood beet; they are the best for winter use. "I am using some now, growth of 1880, perfectly sound and fresh; they were kept in the cellar covered with dry sand." (John Croil.)

Leaf Beet or Swiss.—Is well worthy of cultivation. The leaves have all the flavour of spinach and is more easily raised. Vick in his catalogue says "the leaf stalks, cooked like asparagus, are considered by many, especially in Europe, a great luxury."

Mangold Wurtzel is not nearly so much grown as it should be. The same authority says of it: "In no way can so much good food be grown so cheaply for the cattle." We find Carter's Orange Globe a decided improvement on the old kinds.

Brocoli or Kale is of easy culture. In Scotland it is a favourite dish. But little grown.

Cabbage is a universal favourite, but, unfortunately, the cabbage worm has been so destructive as almost to prevent raising it. Of the many preventatives recommended none seem to be effective. The kinds generally planted are Winningstadt, Large, late Drumhead, Flat Dutch and St. Dennis. Henderson's Early Summer is good, but small; would class with the Winningstadt.

Carrot.—Long Orange and large red seem to be the favourite kinds; prefer the Early Shorthorn and the half long stump rooted for the table.

Cauliflower.—Very few seem to know the luxury of a good dish. We find the Early Dwarf Erfurt the most reliable.

Celery.—Sandringham, Golden Dwarf and White Solid are all good varieties. Difficult to grow on account of thrip.

Corn (Sweet).—Tom Thumb is small but good for an early crop. The New Egyptian is too late for climate: would recommend Moore's Early Concord and Stowell's Evergreen, *both excellent kinds* for late use.

Lettuce.—Victoria Cabbage and All the Year Round are good.

Melons.—I have had good success with what I call the Montreal Musk Melon, raised from seed. I saved from a fine specimen bought in that city many years ago. They have always ripened, are large, netted, and of excellent quality, flesh green. This year I tried the Bayview Melon; very highly recommended; planted ten days later than the Montreal Melon, it soon outstripped it, and when I left for Scotland, 1st July, the vines were most luxuriant, and there was fruit six to eight inches long, the others yet hardly showing fruit; a severe drouth seemed to damage both kinds. The Bayview ripened enough fruit to prove the quality good; it then dried up and failed. The Montreal kind recovered and yielded well. I watered neither kinds; perhaps they would both have been improved by liberal watering. (John Croil). The New Surprise is early and luscious, but too small for market. In water melons have found the Ice Cream good, and the Sculptured Seeded Japan an improvement on old kinds. The Cuban Queen is a new variety, very large and fine, sometimes reaching as high as eighty pounds in weight; vines very strong, healthy and vigorous, flesh bright red, solid, luscious, crisp and sugary, excellent keeper, good to ship to distant markets, rind thin.

Onions.—Top onions are largely grown. Good success has been attained with seed sown of the Large Red American and Yellow Danvers varieties, but consider Red Weathersfield the leading variety.

Rhubarb grows everywhere and thrives on any soil, but prefers a light rich bed. "I was much struck when in Scotland at the effect produced on two plants treated with liquid manure from the barnyard. The leaves were three feet long and about as broad, but the stalks were not in proportion." (John Croil.)

Spinach.—The Savoy leaved, a new variety, is an improvement.

Squash.—Early Crookneck, Hubbard and Vegetable Marrow, yield palatable dishes. The vines would yield more fruit if pinched off, and not allowed to run at such great length.

Tomatoes.—The Trophy, Hubbard's Curled Leaf and Hathaway's Excelsior are the best.

Turnips.—Little cultivated; the little black fly is a great enemy to them.

Summer Savoy, Sage and Wormwood are raised to some extent and with profit to the market gardener.

W. Pemberton Page.
A. W. Taylor.
John Croil.

Mr. Beadle.—I would say with regard to the cauliflower that when we have extreme heat and drought, that frequently prevail in our part of the Province, it is difficult to raise that vegetable. However, I have found that by sowing the seed late, keeping the plants in a cool, shady place on the north side of a fence or by a building, and planting them out the latter part of the summer when we may hope very soon to get copious rains, that they do much better. If the autumn is something like the autumn we have just passed through those plants will head pretty well; and if they have just commenced to "button" when the cold weather begins to come on I take them up and put them in my root-house and set them out again—something like it was described with regard to celery—putting some earth around the roots, moistening the roots enough to have the circulation continue in the plants; pack them closely together—about as close as they would stand—and they would develop in the root-house very fair sized heads—though not as large as if grown out of doors—and the flavour would be very fine.

Mr. Beall.—I would have liked if the chairman of the Committte had submitted something with reference to the profitableness of growing any of these vegetables. It strikes me that asparagus is an exceedingly profitable crop. I have a small bed three rows in width—about four feet and a half and about seventy feet long—and I get from seven to ten dollars from that bed every year in addition to all my family desire to use

in our house, and that is a great deal. And there is no expense connected with it after preparing the ground with it in the first place. In speaking of lettuce there was one kind not mentioned that I think should have been mentioned, that is, the French Cos lettuce. I know that people generally say they cannot make it head. I think a crop of onions can be carried on as profitably, perhaps more profitably, than a crop of any other kind of vegetable. I have a piece of land about seventy feet square off which I have now for the past seven years averaged nearly forty bushels. That would be at the rate of about 300 bushels to the acre. Now, there is no more expense in growing onions than there is in growing a good crop of potatoes. These generally average me about a dollar and a half a bushel. That is in the spring. The only difficulty would be in keeping them safe, and I find not the slightest difficulty in that. I have a building prepared partly on purpose for that. It is a loft over my tool-house. It has a good floor, and on it there is about ten wagon loads of dry dust—black muck from the swamp. I generally add a load to it every year. That gets intensely dry. I spread four or five inches of it on the floor on the first place, lay the onions to the depth of five or six inches, cover that up with dry dust again—the balance of it, and then put on some straw. About the first really cold snap that comes on I open the doors and let the onions freeze if they can. When I believe they are pretty well frozen I close everything up, and never open it again until the time I want to get the onions out, and I find they are in perfect condition apparently. Whether this treatment hurts them or not I do not know ; all I know is I can always sell them readily for a big price. I have grown onions for seven years in the same piece of ground, and I find the last crop as good as the first. Last year I got thirty-seven and a half bushels from that piece of ground.

A Member.—What do you fertilize the ground with ?

Mr. Beall.—With barnyard manure chiefly. I use ashes somewhat, and I use salt very largely. On that spot I generally use half a barrel of salt a year. My barnyard manure I produce in the spring of the year, and shortly afterwards I get a few loads of this same black muck put on to it, and that is turned over several times during the summer, and not applied on the ground until I am ready to trench up for the winter.

Mr. Page.—In reference to asparagus, I was unable to get any data as to the profitableness of that article. I find there was very little of it grown except in very few places. My own experiences of it have not been very pleasing. I have raised onions to a considerable extent, and I find the ground is better adapted to onions the third, fourth, or fifth year than it is the first year, provided it is properly manured. Mr. Beall refers to using muck for onions. I tried that one year, and was very successful indeed with it. I mixed a little lime and ashes with it, and then the onions grew very large and thrifty, but when we came to use them they were so strong that we could scarcely use them at all. I do not know whether that was from the manure, or the muck, or what. The soil that I raised them on was a sandy soil, which I think is the best for raising onions.

Mr. Bucke.—Down our way it has been considered wrong to grow asparagus in beds unless you plant them a long way apart. The roots of the asparagus require plenty of room, and it would be better in rows than in beds. We used to grow cauliflowers down our way, but the cabbage insect has proved so bad that we had to give it up of late years. The most delicious vegetable, I believe, that is grown was not mentioned in Mr. Page's report, that is, the Lima bean.

Mr. Beadle.—Do you grow that at Ottawa ?

Mr. Bucke.—Yes. We generally plant it on sods, either under a cold frame or on a hot bed, and then plant it in hills and grow it on poles. They do not come in until about September. When we plant them in sod we transplant the sod with them.

Mr. Beall.—We have no more tronble in growing the Lima bean than we have the Early China, but I can tell you a wrinkle about the matter. I learned it by negligence this last year. We like the old butter bean—that is, the tall one ; and we like the Lima bean better than any other of that class. Last year I had to neglect some portion of my garden. These beans were neglected among other things. They were neither of them ever poled. They just grew in a perfect mass on the ground near together ; and it was the best crop we ever had.

Mr. Taylor.—We would not have the Lima bean in our garden. It is no profit to

us. We want to grow things in our garden to make a living out of. The cauliflower we cannot raise any more in our neighbourhood satisfactorily. I can remember the time in Hamilton when we got as high as half a dollar a head for it, but now I do not know that I sell two dollars worth of cauliflower in a year. It is eaten with the insects. As for onions, I have grown them successfully for twelve or thirteen years in the one place, but now I cannot grow them—not to any account. The maggot and the thrip have totally destroyed them. Then celery we used to raise, but we cannot do it any more.

Mr. Beadle.—What do the gardeners grow for a living?

Mr. Taylor.—We raise a few things, and manage to raise a living. We raise potatoes, and we can raise a few cabbage by putting them in large fields. We can grow beets; I do not know that anything has attacked them yet. We grow carrots too, in large quantities.

Mr. Beadle.—You used to find asparagus profitable, didn't you?

Mr. Taylor.—Yes; and it is now, where people have good places for it.

Mr. Arnold.—Can you tell us whether there is more than one kind of asparagus?

Mr. Taylor.—Yes; there are half-a-dozen kinds.

Mr. Arnold.—Can you see the difference in them?

Mr. Taylor.—Yes. We plant them in rows so that we can get through between them.

Mr. Bucke.—Have you tried putting salt on the ground for destroying the worm that eats the onions?

Mr. Taylor.—Yes; we have tried salt, and we have tried ashes, and we cannot get rid of it.

Mr. Willard.—In regard to the cabbage worm, I was very much interested last month at a statement made at the Michigan Horticultural Society on that subject. It was stated, as a fact, that the use of pyrethrum or Persian insect powder was positive destruction to the cabbage worm. It was said that two teaspoonfuls to two gallons of water applied to the plants with a syringe—frequent applications to it—was perfectly effective. The question was brought up whether it would be safe to use London purple or Paris green for it, and the gentleman said it would not. He mentioned this as a remedy that was not dangerous to use. He said it was not poisonous. He stated that they had used it at the Agricultural College at Lansing with great effect.

On motion of Mr. Beadle, seconded by Mr. Honsberger, committees were appointed as follows:—

On New Fruits.—Messrs. Morris, Allan, Gott, Gilchrist and H. Young.

On Ornamental Trees, Shrubs and Plants.—Messrs. Wellington and Leslie.

On Vegetables.—Messrs. Bucke, Page and Taylor.

On Roses.—Messrs. Beall, Wellington and Dempsey.

With instructions to report to next winter meeting.

THE CHESTNUT.

"Is the Sweet Chestnut a profitable tree to cultivate for the nuts?" was the next topic brought forward for consideration.

Mr. Beadle.—The price of chestnuts has been going up in our part of the world right along this four or five years. It is a favoured part of the country too for chestnuts. A large part of the County of Lincoln is just chestnut land, and I can remember when it was largely covered with chestnut trees. But they have gone before the woodman's axe, very many of them, and the price of chestnuts this year was about four dollars a bushel from the farmer's hands. I can remember when we used to get them for about half that—only a very few years ago too. I do not know whether a chestnut tree yields one bushel, or five, or ten. There is another thing about the chestnut trees. Well, these things go by fashion, so I suppose we cannot always rely upon them, but for a while the chestnut tree has been a very fashionable tree for finishing the inside of houses—for win-

dows, doors, etc. It is used also for furniture. I think the price of good chestnut lumber has been about $25 a thousand.

Mr. Bucke.—I have been trying to grow chestnuts in Ottawa for a number of years, but instead of the trees growing up they are going up all the time. I cannot grow them there ; it is too cold for them. It is a very pretty tree, and I wanted to grow it for an ornamental tree. The wood is highly ornamental for furniture.

Mr. Arnold.—I would say chestnut trees were profitable where they would succeed. I know a fair-sized tree will yield a good many bushels of nuts. We can scarcely grow chestnuts in my section of the country. They cannot be grown north of the Grand Trunk Railway. They grow a few miles south of me.

Mr. Page.—I have lived in the chestnut country all my life, in the County of Welland. The trees grow very freely. I have seen in cutting down forests abounding in chestnut trees, that where we would cut down one chestnut tree five or six more would grow up around it. I have cut all these down to one stock and let that grow, but I have never been able to get many nuts off that tree in ten years. A chestnut tree will hardly bear short of fifteen years. I have seen chestnut trees bear from four to six bushels of chestnuts, but it takes a pretty large tree to do that. With us it is one of the most valuable timbers we have.

Mr. Gott.—In answer to this question I would say "yes." The tree is an ornament to any country. Its fruit is very respectable, and always commands respect. It will bring in our market about $4 per bushel. The young trees will usually commence to bear in favourable locations at the age of from seven to ten years, and go on increasing more and more until they attain their full size. The timber is valuable for a variety of purposes, both indoors and out.

Mr. Honsberger.—I would say as to the nut-bearing qualities of the tree "no," but as to the timber qualities "yes." Although the nuts are very acceptable to people generally, yet they are very indigestible, and consequently useless, in my estimation, as food. I was brought up in a chestnut country, and gathered many a bushel of the nuts, but for the last three or four years I do not think I have eaten that many chestnuts, because I find them very injurious to me as food. But I prize the lumber very highly as being equal, if not superior, to the black walnut. I think that for the timber it would be very profitable to grow.

ROADSIDE TREES.

The next topic was "What are the best trees for country roadside planting ?"

Mr. Beadle.—I would suggest that one of the prettiest trees for country roadside planting is the rock elm. Of course the roads must not be too narrow where those trees are planted, or the trees be planted too thickly, because they will shade quite a space. I would also mention besides that our own white ash. If the trees should happen to be planted too thickly, so that it will be necessary to take some of them out, the wood will be worth all that the trees have cost.

Mr. Bucke.—I would suggest the black walnut, providing it is planted in great number, so that the boys shall not break them all down to get the nuts ; also the maple. In fact, excepting the soft wood trees, I do not know of any tree that would not be suitable for a roadside tree.

Mr. Honsberger.—I like for a country roadside tree the Norway spruce, and then between them, at a nice distance for a walk, plant the soft maple.

Mr Bucke.—I think the Norway spruce would be apt to make drifts in the winter time, if there should be much snow.

Mr. Honsberger.—A person would naturally think so, but I can say that I am very fortunately disappointed in that myself. I have planted them by the roadside, both running north and south, and running east and west, and they are not liable to cause the snow to drift.

Mr. Drury.—We plant maples in our part, on account of their assuming such a beautiful shape in a few years. We also plant the spruce and the white pine.

Mr. Bucke.—The great trouble in planting roadside trees is the cattle. Until we can get some law passed to prevent cattle running at large, it is difficult to prevent the cattle rubbing them down. I look upon the subject of tree planting as depending entirely on the cattle question.

Mr. Dempsey.—I fully endorse what the secretary says respecting the elm. In some of the Eastern States they use the elm, and they are certainly all that we need desire for a roadside tree. I have seen the white bark birch planted on the roadsides. It certainly is a very pretty tree—attains a very graceful and beautiful form, and I think it is much prettier than the maple, particularly the hard maple. The soft maple makes a rapid growth, and it is a very pretty tree for the roadside. Where the black walnut grows alone it appears to attain too much of a spreading habit. I presume it could be trimmed up. Speaking of the elm again, I believe that on the front of Sidney, in the County of Hastings, they have one shade tree in a distance of about twelve miles. They deserve thanks for leaving that. That elm spreads farther than the width of the room, and I have driven under it frequently when I have been out on that road in the summer—it is a very hot road—and I have enjoyed a rest there very much. And I presume my horse has enjoyed it more than I have. Any one who has ever stopped to rest in the shade of a tree like that can certainly appreciate the value of the elm.

Mr. Drury.—There is no doubt that in the absence of a stock law in this country the planting of trees on the roadside will be very rare indeed. As a matter of fact, if one municipality takes a stand against cattle running at large, the adjoining municipality may not take the same view of it. And in that way the measure of the first municipality may be rendered abortive. In our part of the country we have a few very nice drives, that have been made by a little care in the clearing up, by parties taking the trouble to throw the brush back and leave the trees in a line. Speaking of the country as a whole, it is almost impossible to say what tree is the best for roadside planting. I think we must first have a stock law, and then I believe there will be a desire on the part of municipalities, as well as on the part of individuals, to beautify our roads by planting trees.

Mr. Page.—I prefer for the roadside either elm or maple; but, as has been said by former speakers, it is useless to talk about planting shade trees on the roadside while the cattle are running at large.

Mr. Gott.—There are three or four kinds of maple that are very valuable. The only objection to planting it is that the roots spread so far in the soil. But it is a very beautiful tree. Our basswood tree for roadside planting is not only ornamental but useful. The chestnut tree would also make a very beautiful shade tree. It is both useful and ornamental likewise. So also is the hickory. The Lombardy poplar and the ironwood tree are beautiful trees for our roadsides.

GENERAL DISCUSSION ON TREES.

Mr Beadle.—With regard to trees for towns and cities, the best growing tree, and the one which has been the most popular on that account, is the silver-leafed maple. It is sometimes called the soft maple, but there are other soft maples. The botanical name is *Acer dasycarpum*. It grows so fast that sometimes the branches split during high winds, and I have found it necessary to take the saw or the pruning knife to the trees and head them back so as to make them grow more compactly. If this were not such a fast age, and we were not in such a hurry to have shade trees, I would prefer the sugar maple. It is a more cleanly tree, if possible, than the silver maple. It does not sprawl so much; it has a brighter and closer foliage, and, I think, is more symmetrical and beautiful to the eye. If you ask me what tree I would take next to that I get puzzled. There are several trees. There is a tree that we call the ash-leafed maple. It is not a maple; it is not an ash. Botanists have put it under the head of *Negundo aceroides*. It is a hardy tree—I suppose a more hardy tree than the sugar maple. It will grow as far north as

any tree can grow. It does not make as large a tree as the sugar maple. It makes a very pretty medium-sized tree with a rather compact head and pinnate leaves. The prettiest native evergreen for ornamental planting is what is commonly called the hemlock, but it needs to be planted with some care. It needs nurses. If you take one hemlock tree in any part of the country and set it out on the lawn by itself, ten to one but it will die out; but if you will plant a little group of trees—a hemlock to each three or four Norway spruces—and let them grow together, and gradually cut out your Norway spruces so as to have a clump entirely of hemlock, after a while you will have one of the most graceful groups of the prettiest of all the evergreen tribe. Our balsam fir, while it is young, makes a pretty ornamental tree, but when it gets to be twenty-five or thirty years old it loses its lower branches and ceases to be an object of beauty. Our white spruce would be my choice in preference to the balsam fir. I think it will hold its limbs pretty well. It certainly will hold its limbs at the ground much longer than the native balsam. The Weymouth pine—our common pine—is a beautiful thing; but you ought not to plant it on small lawns. It is a beautiful tree planted alone, and allowed to have free scope to develope itself. Will it pay to plant the black walnut for commercial purposes? I suppose there are none of us who can speak from experience. If a man has a piece of land that is suitable for the black walnut and not so very suitable for tillage purposes, being broken and uneven, I believe that it will pay a person well who will take care of a plantation of that sort for twenty-five years. The wood, as we all know, commands a very high price in the market for the sake of the lumber it makes. It is continually growing scarcer, and the price is going up. I can see no reason why a plantation of that kind well taken care of should not pay well. I have heard it said that the nuts ought to pay something. If you go to a grocer in town and ask him for a bushel of black walnuts he will charge you half a dollar for them; but I think you could scarcely sell ten bushels of them if you wanted to. Will it pay to plant the white ash for commercial purposes? We know that wood is used for almost everything, agricultural implements, carriage making—in every useful branch of industry where woodwork is wanted the white ash will come in play; and, I believe, under the same circumstances where black walnut might be made profitable white ash might be too. To the westward of us, in the United States—in those treeless prairies—they are planting the white ash very freely. They have great faith in it as a tree for forming shelter belts, as well as a timber tree. I believe the hickory would also pay. The nuts of that will sell for something. I do not know what the market price is. I know that the wood is being sought for for various purposes—for spokes of wheels, for felloes also, I believe—and for hammer handles, axe handles, and that sort of thing. I believe a plantation of hickory on broken soil—on ground suitable for it—would be a profitable investment for a man to make. I think the time is coming when these subjects should be agitated and discussed. It would not take long to compute how much lumber you could get off a given acreage by knowing a little of the growth of these trees. I have been told about the hickory, that the demand for hoops is becoming so great that it would pay to set out a thick plantation of hickory trees, let them grow to perhaps a little thicker than your thumb, and then cut them down and split them in two for hoops.

Mr. Drury.—There is one native evergreen which I think the Secretary has overlooked—that is, the cedar. I was not aware, myself, until this last summer, that it was possible to get it to present such a fine appearance—not until I had an opportunity of visiting the farm of Mr. Dawson, in the County of Kent, about a mile from Chatham. There I saw cedars carefully trimmed and pruned to the most beautful shapes. Of course, we know that if we allow a tree to grow as it will, without any pruning or shaping, it is not likely to present a very attractive appearance. The cedar is a tree that could be used for hedges. I do not say that it would be a lasting tree, but I have known it to last as a hedge for twelve or fourteen years. I saw a hedge of that sort on Mr. Dawson's farm. Near my own place a large orchard is partly enclosed by a cedar hedge, and it presents a very nice appearance. Then, too, I think the Secretary has hardly placed the spruce in its proper position as an ornamental native evergreen. The spruce, in my opinion, is one of the very finest of native evergreens. Its colour is very pleasing, and without giving it any attention it will grow into a very nice shape. I fully agree

with what he has said in regard to the hemlock. The white pine also is a tree that can be pruned into shape. I have seen a very nice little arbour made by planting four or five pine trees in a circle, and then trimming the inside and the outside. This can be seen on Mr. Dawson's farm. I am not disposed to think it would pay just at present to plant the white ash for commercial purposes, because it is a tree that is growing in considerable numbers in various parts of the country already.

Mr. Beadle.—Is it the red cedar you are speaking of?

Mr. Drury.—No; it is the white cedar—the *arbor vitæ*.

Mr. Beadle.—It is the *arbor vitæ*, but not the white cedar; what is known by botanists as the white cedar does not grow here. The *arbor vitæ* would make a very pretty hedge, and bear trimming as you have said.

Mr. Beall.—Questions have very often been asked me within the last year or two as to what size the black walnut will attain in a given number of years. I have been endeavouring to find some answer to the question, but I have not succeeded very well. I am hoping, however, to get more correct information from England on that subject. I think the probabilities are that there are English authorities more reliable than anything we have in this country as to our Canadian black walnut. We find that the Canadian black walnut was introduced into England in 1656; and I know of one tree that is about 153 years old, standing in England at the present time. That tree is now upwards of five feet in diameter. It is at Fulham Castle. It is now in a perfectly healthy condition.

Mr. Dempsey.—We have in our neighbourhood a black walnut tree—I could not tell you the age of it, but it is very little less than two feet in diameter at the base of the trunk. The limbs branch low—probably six or seven feet up. I asked the present owner of the property how old the tree was. He said, "Oh, I don't know; it must be about 120 years old, I think." I asked him how he knew. "Why," he said, "it was planted by my grandfather." "But," said I, "the county has not been inhabited more than seventy years." I think it was probably planted about seventy years ago. There is another tree I took Mr. Beall to look at, is planted in another part of our county, which would make about two standard sawlogs. That tree also must be about seventy years old. There is a hickory tree that stands very near my house on a neighbour's premises, which forty years ago I saw an uncle of mine pruning up. It was a little bigger than my thumb at that time. That tree has more than twenty inches of diameter of trunk now. The whole tree is not standing; it forked, and in a heavy gale of wind it split down, and half of it has failed. I fancy that the black walnut or the hickory could be brought up in thirty years—perhaps twenty years—to quite a commercial size, and I believe it would be profitable if properly cultivated; but it would be necessary to cultivate close so that the branches would not lie too low.

The Association then adjourned *sine die*.

SUMMER MEETING.

The Summer Meeting of the Fruit Growers' Association of Ontario was held in the Town Hall at Trenton, on Thursday, the 13th day of July.

Order was called by the President, Mr. Dempsey, at half-past nine o'clock, when the discussion of the first question on the programme, "Is the Cultivation of the Raspberry for Market profitable?" was at once entered upon.

PROFITABLENESS OF THE RASPBERRY.

Mr. Gott having been requested to speak on this subject said:—I am very sorry that you have called upon me to speak to a question of this kind at so early a period of the meeting, as I have not thought of the matter to any great extent. To the question "Is the Cultivation of the Raspberry for Market profitable?" I should, however, say most

decidedly, yes. It comes in at a time when fruit of that class is very much needed—just after strawberries are done, and when consequently the demand for something of that sort is very great. I would beg leave to decline advancing the discussion any further at present. I should like to have an opportunity of thinking of that matter a little more.

Mr. Young.—So far as my experience has gone I have found raspberries to be very profitable for the market. I have cultivated two red kinds, the Clark and Philadelphia red. I find that the Clark is a very fine berry. It sells as well, and brings a higher price, but is not so productive—not, probably, quite so profitable—as the Philadelphia red. It is a little too soft for market. The Davison's Thornless has done very well with me. In a very dry time it is very apt to dry up. On the whole, my experience is that raspberries of the different varieties are profitable for market.

Mr. Gott.—Very much depends on the cultivation and the location of the plantation, and also upon the season in which the berries are grown. For a profitable raspberry plantation you require deep soil, very fertile, and not too much exposed to the influence of the sun. The berry requires to be planted in regular order and thoroughly cultivated. It should be kept thoroughly clean. The canes should be pruned when the young cane is rising, say, about three feet. It should be carefully pruned so that it gets no higher. That practice should be applied to both the black caps and the red caps. The result will be that the side branches will start out the whole length of the cane, and the fruiting qualities of the cane will be more than doubled—sometimes trebled. The site, too, has quite an influence on the raspberry crop. Where the site is very dry, and very high moisture is lacking at the time that the raspberry needs it, the consequence will be that the crop will dry up. To obviate this a site should be chosen which leans from the sun, gently towards the north. This has a very good effect upon the fruit. The distance that we plant for profitable culture is four feet between the rows and three feet in the rows, and the old stools keep perfectly to themselves. In the spring we go through with the cultivator and the hoe. In this way we keep the raspberry plantation looking very pretty. At the time the fruit is ripening it is really a picture worth looking at. The blackcaps require a little different management from the red, especially if young plants are required, but it is found not to be profitable to raise young plants and fruit at the same time.

Mr. Edwards.—Although I am in a very small way in raspberries, still I should say that raspberries would turn in money at an average of about ten cents against strawberries at eight cents. The crop will run in about the same proportion against the raspberries again—there will not be so many raspberries taken off the same amount of ground as of strawberries. But it must be remembed that raspberries will last a greater number of years than strawberries. You are only losing the use of the land one year in five with raspberries, whereas with strawberries you lose the use of it one year in two, or one year in three, at any rate. I have a high board fence, and the scantling is four feet from the ground—that is, to the top of the posts; and I prune my raspberries as soon as they get to the top of the scantling. In this way I make a very pretty fence. The raspberries take up no room practically. I use pieces of buckskin or anything of that kind to tie the bushes to the fence. I find that the berries have done better with me this year, twice over, along the fence, than in the middle of the garden. I find sometimes that the young shoots coming up will die down in a short time. I do not know what is the reason of it. Perhaps somebody can inform me. Then I have had a dozen whole plants die.

Mr. Wright.—Allow me to ask the gentleman on which side of the ground is his fence situated.

Mr. Edwards.—The fence is on the west side of the raspberries. The part I speak of in the middle of the garden is hardly in the middle. It is rather in one corner, and it also is partly shaded by the fence.

Mr. Wright.—I live so far north that it is very difficult for me to grow any varieties at all, and consequently my experiance has been very limited in that respect. A great number of varieties that other gentlemen in this room can grow I cannot at all.

Mr. A. M. Smith.—I find the raspberry crop quite profitable in the locality where I

live. I do not suppose it would be back where you have plenty of wild ones, but near all our large towns and cities it is very profitable.

THE PRESIDENT.—How does the cultivation of the raspberry compare with the cultivation of the strawberry in regard to expense and profit?

MR. A. M. SMITH—The expense of cultivating the raspberry is no greater, taking all things into consideration, and the profits with us, as a usual thing, are better. We do not grow strawberries much for market, because in our neighbourhood for the last few years the market has been rather overdone, and where strawberries sell at from five to six cents a quart wholesale it pays better to raise raspberries at from ten to fifteen.

MR. BEADLE.—Which will yield the most to the acre?

MR. A. M. SMITH.—Strawberries no doubt will.

MR. BEADLE.—Can you give us any idea how much more?

MR. A. M. SMITH.—I do not know. It depends on the varieties and cultivation. Some varieties of raspberries will produce as much as strawberries. Take the Philadelphia, for instance. But there is this about raspberries: if you get them once planted out you get a good succession of crops for five or six years, whereas strawberries you have to renew every two or three years. Taking the replanting of strawberries into consideration I think raspberries can be cultivated cheaper than strawberries.

THE PRESIDENT.—How much cheaper could they be cultivated? Could they be done for half the money per acre?

MR. A. M. SMITH.—No; I do not think they could. Perhaps they might be cultivated twenty-five per cent. cheaper. There is more pruning and the like of that in raspberries. That takes up some time, of course. As far as the mere cultivation of the ground is concerned, they are much easier cultivated than strawberries.

MR. BEADLE.—Don't you find it necessary to prune off the runners of some of your strawberries in order to get a good crop?

MR. A. M. SMITH.—Yes; some varieties we do.

MR. ALLEN.—Our wild crop is so large that we grow the cultivated varieties to only a very limited extent. There is one grower there who says it pays to grow them, however. I do not know all the varieties he cultivates. I know he did cultivate the Philadelphia largely for two or three years, and he said it paid him. Our wild varieties, however, sell at from five to seven cents as against ten to twelve cents for the cultivated.

MR. A. M. SMITH.—We have contracted for five thousand quarts at ten cents a quart for the Philadelphia for canning purposes.

DESIRABLE VARIETIES OF RASPBERRIES.

The next question considered was "What varieties of Raspberry are most desirable for Market, Drying, and Domestic use?"

MR. DEMPSEY.—This question was to have been introduced by a paper from myself. Unfortunately my time has been considerably limited recently. I prepared some notes yesterday, but I came away and left them in my office. However, the subject is quite an extensive one. The question should be a trifle changed. I should have altered it a little in my paper, and simply have considered whether raspberries are profitable for the farm. Mr. Gott has given you a description of their culture, so that that part of the subject it is not necessary for me to speak of further than to say that the red raspberry requires very different treatment from the blackcaps. They require considerable shade, and if we can provide shade in some way without reducing the fertility of the soil it is very much better than if we are obliged to plant them in the shade of trees. Such a site is very difficult to obtain, however.

MR. BEADLE.—Which is it that wants shade?

MR. DEMPSEY.—The red ones—the common wild varieties and their seedlings. When it comes to a question of which varieties are profitable for drying and for domestic use, the first thing we have to look for is a variety that is sufficiently hardy to

endure the severity of the climate. We find, in experimenting with our cultivated berries, that such varieties are very few. First among the red varieties I would place the Highland Hardy for a farmer, or for any person who was an amateur grower. For market purposes I do not think that we require it at all from the fact that it comes in conflict with the strawberry—comes in a little too early. An amateur grower wants a few early raspberries, but we do not want them to interfere with the strawberries. Next I would place on my list the Philadelphia red—not on account of its quality—the flavour of the berry—because it would rank third in regard to that point, but it certainly will produce more fruit than any other variety I have ever seen grown yet. The yield is simply enormous. I have seen, in a row of those berries only thirty rods long, six girls picking from morning to night, and not get through with the single row. So that you can judge what an acre would produce of those raspberries. I would place next as amateur berries the Clark and Herstine. The difference in those varieties is very slight when we come to compare profits. The Herstine is not so likely to become small and crumble up as the Clark. It is not so soft as the Clark, and I think it is fully as prolific and fully as hardy. I would place next the Turner and the Reliance. Those are seedlings of the Philadelphia. I think they are nearly as prolific as the Philadelphia—perhaps quite so; and they are nearly double the size of the Philadelphia. But I fail to find any improvement in the flavour; they are very near the same. But were I to be confined to the cultivation of one raspberry I would choose the Cuthbert. The Cuthbert so far with us appears to be perfectly hardy. I have never seen a cane frozen. Of course it has only gone through two winters with me. It seems to be quite prolific. We do not get so many bushels to the acre of it as the Philadelphia, but I certainly think one bushel of it quite equal to two of the Philadelphia. It seems to be sufficiently firm to ship any distance that we can ship strawberries. I think I would be justified in saying that it is a first-quality berry with regard to flavour. The Cuthbert would be very profitable for drying purposes. I find that people who have got berries from us prefer the Philadelphia to all other varieties for making raspberry jam. When you come to the black cap varieties they are very easily cultivated. It seems like no labour at all to grow a few rods square of any kind of raspberries, in fact. I prefer to have three or four varieties, and I would place first of all, on account of its ripening early, the Doolittle. Some of you, in view of all the new varieties that are in cultivation at the present time, may be a little astonished at my placing the Doolittle first. Nevertheless it is not to be despised, although it is one of the oldest varieties. Next to it I would place the Ontario. The Ontario is a long way superior to the Doolittle, but it matures a little later. It is very prolific; and the flavour is a little better than that of the Doolittle, I think, but very nearly the same. Next I would place the Mammoth Cluster; I think it will never be superseded. I thought the Gregg was going to be superior to all others for drying purposes and shipping, but I find there are a great many canes frozen on our grounds. I question whether it may not be a little tender in some soils. In cultivating raspberries we should avoid a soil which has too much moisture, as it encourages a late autumn growth. I have found varieties to prove perfectly hardly only a little away from others that would be frozen to death during the winter. For an amateur variety there is nothing in our premises that will compare with one of Mr Saunders' seedlings—two of them, in fact—No. 55 and No. 70. We might place them between the Doolittle and the Philadelphia red. In point of fact, they are like a sample of the two varieties mixed in together. The colour is, however, against them. They have a kind of purplish blue colour, and are not attractive in a basket, but they are quite as attractive as any when they get on the table. They do not all mature at once, which, I think, is an advantage in them, as in that way their season is materially prolonged. Another variety that I would not like to be deprived of the pleasure of growing, is the Diadem, a seedling of Mr. Arnold, but I would not like to say whether it is a red berry, or a yellow berry, or a white berry. It is liable to throw up a sprout which will produe yellow berries, while another will produce red berries, and another will produce berries that are almost white. And all from the same root.

Mr. Beadle.—Allow me just at this juncture to ask the meeting to be kind enough to accept your remarks as being perhaps as valuable as your paper, yet at the same time to request you to write out your paper in full. We have a use for papers besides hearing

them read here. We have here a comparatively small audience, but through our reports and the *Horticulturist*, we have an audience of not less than 2,500 people. We have an actual circulation of about that number, and we know that our reports are read by about as many more; so that I suppose about five thousand would be about the audience that we would have for that paper.

Mr. Dempsey.—I will prepare the paper.

Mr. Gott.—There was one class of berries that was not mentioned by the President. They are the class known as ever-bearing raspberries. Why they are thus designated I can scarcely tell you. One of the best of these is an old English variety called Belle de Fontenay. If you deprive it of the early crop you will get a very excellent late crop. If you allow the early crop to mature you will only get a medium late crop. Another of that class of berries is the Marvel of Four Seasons. There are some objections to the first I have named. It is a very rampant grower, but that can be easily managed. Cut down the shoots and keep it in bounds, and it is a profitable and excellent variety. The fruit is simply superb. We think very highly of the Gregg up our way. It is thought to be better than the Mammoth Cluster in some respects. It prolongs the season, and is found to be very profitable. We have had no indication of tenderness on the part of the Gregg.

Mr. Dempsey.—How does it compare with the Mammoth Cluster in colour?

Mr. Gott.—We think it has a little darker colour, and not so much of the white bloom that the Mammoth Cluster has. It is of a beautiful shining black. There was another red—two indeed—that might have been mentioned also. One of them, called the Noami, we find to be equal to the Turner, and in some respects better. The cane is very productive, and quite hardy. There was a remark made about the Clark crumbling considerably. Now, we have never had this experience with the Clark. With us it is first-class both in quality and in productiveness.

Mr. A. M. Smith.—I differ a little from the President with regard to the Highland Hardy. We find it one of our most profitable market berries. It is free with us from the objection that he spoke of. In regard to its coming into competition with the strawberries, our strawberries are usually done by the time it ripens. As far as the other varieties he mentioned are concerned I would agree with him. I think our friend Gott has made a little mistake with regard to the Gregg—as to the white bloom he speaks of being darker than on the Mammoth Cluster. I think if he would reverse that he would have it nearer right. I think there is more of it on the Gregg than there is on the Mammoth Cluster.

Mr. Saunders.—I hardly think it would be well for this Association to recommend the Belle de Fontenay as a berry for even amateurs to grow. I have been trying to grow it in London for a number of years, and have rarely had anything on it—sometimes a few berries at the end of the year, but not enough to pay for cultivating it. Mr. Gott's premises are admirably adapted to growing raspberries. The soil is exactly fitted to it, and is in close proximity to the lake. In our section of the country I have never known but one man who has grown the Belle de Fontenay with anything like success, and he exhibits the fruit very late as a curiosity. I do not think it would be a very profitable variety to grow for market. Some notice has been taken of my own seedlings by the President; and as I have no plants to sell I suppose I may say a word on the point. The seedlings apppear to be more hardy than any varieties that I have. I still have the old plants that have been growing for eight or nine years, and they are still bearing good crops. No. 55 seems to me one of the most desirable, although 70 is about equally good. 69 is another one that stands about the same as 70. 69 comes in about the time of the Philadelphia, whereas the 55 comes in later. The colour of these berries is against them as market fruits, but for canning they are very delicious indeed; and in cooking them, of course, the dull colour of the surface of the fruit entirely disappears, and they make a prettier jam than you can of the Philadelphia or the Doolittle. The Mammoth Cluster succeeds better than the Doolittle on my grounds. The Philadelphia, of course, is a stand-by, and produces a large crop.

Mr. Beadle.—With regard to the Belle de Fontenay, I am glad Mr. Saunders cautioned our friends about it. In our part of the country—the County of Lincoln—we find it is not a desirable crop to grow. If you allow it to bear a summer crop it comes

in with the other raspberries, and it possesses no qualities different from the others. Then if you allow it to produce an autumn crop our appetite for raspberries is gone then, and we are getting in our autumn fruits. But there is a place in Canada where just such a variety as that is desirable. I remember receiving a letter from a gentleman in Ottawa in which he spoke very highly of these autumn-bearing raspberries. They did not have any peaches there, he said, unless they bought them at very high prices, and he thought these autumn-bearing raspberries quite an acquisition to them. Mr. Wright lives up in about as cold a part of the country as there is, and perhaps he can tell us whether he finds these autumn-growing berries valuable there.

Mr. Wright.—I have been led astray so often by people recommending varieties that really were not what they represented them to be that I have become skeptical on a great many of these points. With us the great thing is to find a variety that is perfectly hardy. My experience has not gone over a great many years; and if I were to recommend a variety here and say it was perfectly hardy, I should want it to be so. Now, I contend that no man in one or two or three years can tell whether a variety is hardy or not. At least, that has been my experience. There are a great many sections of the country that are very trying on all kinds of fruit; and I live in one of those sections. Now, the hardiest variety I have found yet among the red varieties—if you call the one I refer to a red variety—is Saunders' No. 70. It is not the choicest variety you can have, but it is the choicest I can grow. I had this last winter, the Cuthbert and the Saunders No. 70 growing side by side; and every single cane of the Cuthbert was killed to the ground, and not a single portion of the Saunders' No. 70 was killed. With reference to black raspberries: the variety that has proved most hardy with me is the Mammoth Cluster. It has turned out tolerable hardy, although even it has suffered injury some winters. There are a large number of other varieties that I have under trial, but I think it should not be desirable either to praise or condemn them until I have had further experience of them; as to do so might lead people astray.

Mr. Matthieson (Ottawa).—My case is precisely that of Mr. Wright's in regard to Mr. Saunders' raspberry.

Mr. Bucke.—The Saunders' raspberry that I have is an exceedingly prolific one. I do not know what number it is. The only objection that I find to it is that the shoots break off very readily in a wind. As a canning fruit there is no raspberry that can compare with it. It has a peculiar flavour of its own. I have some seedlings from Mr. Saunders' raspberry that I thought very highly of last year, but whether because they grew so long, or for some other reason, they have not come up to my expectations this spring at all.

Mr. Saunders.—That breaking off of the canes—is it due to the deposit of the eggs of an insect?

Mr. Bucke.—No.

Mr. Saunders.—I think that may be accounted for as owing to the fact that Mr. Bucke manures his ground so much that the canes grow very high.

Mr. Dempsey.—Have you ever practiced pruning back when they attained a certain height?

Mr. Bucke.—No.

Mr. Dempsey.—Any raspberry will break off if it is allowed to grow up five or six feet high.

Mr. Beadle.—I was just going to suggest as a remedy that which has just been mentioned.

Mr. Wright.—I never discovered anything of the kind in mine; and I may mention that no attention whatever is given to those raspberries of mine. They are in the most unprotected portion of my grounds—that is, facing the north. I find that the portion facing the north is the best part of my grounds for raising any kind of fruit.

Mr. Peck.—My Mammoth Cluster was blown down by the wind.

Mr. Wright.—I would like to ask if the Belle de Fontenay is a hardy variety.

Mr. Dempsey.—With me it is sufficiently hardy until fall, but we find invariably the canes are dead in the spring. We get a crop from the new wood, however—the branches from the bottom. It is an autumn bearer; and in the case of any of these

autumn bearers it does not matter whether they are hardy or not. It would certainly be no good to you for a summer crop.

Mr. A. M. Smith.—This variety has been sent out under another name. A few years ago they were recommending an autumn variety very much on the other side, called the Amazon. I sent and obtained it; and it was exactly the same.

Mr. Beadle.—A very enterprising firm in Connecticut brought out a raspberry with a great flourish of trumpets, called the Henrietta; and it was nothing but the Belle de Fontenay again.

Mr. Bucke.—Has anyone tried the Franconia?

Mr. Leslie.—It is all killed with us this year.

Mr. Saunders.—It has killed with me the last three years. We have not had a berry.

Mr. Beadle.—I have had to give it up.

PROFITABLENESS OF SUMMER APPLES.

The next question on the programme was "Is it profitable to grow summer varieties of apples for market?"

Under this head Mr. Beadle submitted the following paper by Mr. Linus Wolverton, of Grimsby:—

IS IT PROFITABLE TO GROW SUMMER VARIETIES OF APPLES FOR MARKET?

BY L. WOLVERTON, GRIMSBY.

In answering the question before us there are several circumstances which need to be considered. To the farmer who has his fields of grain to harvest, an early apple is unprofitable, because at that time of the year he cannot give it the attention necessary to market it successfully. To the fruit grower who is situated at an inconvenient distance from trains or markets, early apples are unprofitable, because the most successful way of shipping them is in small, well selected packages. But to the large grower who is situated near a good market, or to a convenient shipping station, we are confident the summer apples are profitable, and of late growing in favour.

Poor apples are a drug at any season of the year, and some of the early and small varieties can scarcely be given away, but prime fruit, properly handled, can always be made profitable whether it be in spring, summer, autumn or winter.

The question then is, have we early apples of prime quality? Let us bring under our review some of the most prominent varieties.

The *Early Joe* is well spoken of in some localities, a yellowish apple of excellent quality; but it is too small and not sufficiently productive.

The *Baenoni* is an excellent apple from Massachusetts. It is pale yellow, marbled with crimson, pleasant to the taste, and very good for table and market; but it is too small to be planted largely for profit.

The *Early Strawberry* is a beautiful apple having its origin near New York City. It is yellowish, and is striped and stained with bright and dark red except on the inner and lower boughs where the sun does not penetrate. This apple would be highly profitable by reason of its beauty, but for two faults; first, it is a shy bearer, and second, it is very uneven in size, the fruit on the inner and lower branches being sometimes so small as to be quite worthless.

The *Golden Sweet*, an old Connecticut apple, deserves notice. The fruit is above the medium size, of a pale straw colour, and is produced each alternate year in enormous quantities. Coming into maturity toward the end of August, and fit for shipping soon after the beginning of the month, it commands a ready sale at a time when the markets are scantily supplied with apples. It usually brings from $2.00 to $2.25 in the Montreal market.

The *Sweet Bough* immediately precedes the Golden Sweet, and this promises to be a remunerative apple. It is large, of a beautiful light yellow colour, and it sells well in baskets as a dessert apple. But for this purpose it must be gathered, like peaches, a few at a time as they mature.

The *Early Harvest* is a well-known American apple of a bright straw colour, when mature, and bearing heavy crops every alternate year. This apple has no peer in the market during the month of July. It is a general favourite, and gains favour annually. The time was when this apple was sold at Grimsby for 50c. per bushel, but now a basket of fine specimens, or about one third the quantity, will often sell for the same amount. But to realize the best prices, proper handling is all important, and to do this the grower must be wholly devoted to his business, for if his attention is drawn aside by a crop of grain just when his harvest apples need their first picking, he will find them wasting on his hands. The Early Harvest bears heavily, and ripens unevenly. It needs its first picking while apples are quite immature to thin the crop. These will bring a good price for cooking, and the balance may be shipped in baskets or barrels as they approach maturity. I remarked that it bears heavily, but the fruit being small, the average yield per full grown tree is only about four or five barrels, and not half what may be expected from a Baldwin or Greening.

I will now give you a table of prices obtained for Early Harvest apples for three years past which will give a practical turn to my rambling remarks.

1879	July 9th,	Toronto Market	$2.25 per bl.
"	" 29th,	Montreal "	$3.50 "
1880	Aug. 9th,	" "	$3.50 "
"	" 19th,	" "	$3.00 "
"	" 17th,	" "	$3.50 "
1881	July 21st,	Montreal "	$4.00 "
"	" 8th,	" "	$3.00 "
"	July 25th,	Toronto "	60 per basket.

These are a few figures of actual sales from our shipping book, of course the best we have to show, but they suffice to show the possibility of getting good prices for summer fruit.

Now we have to mention the apple which heads the list as a summer apple, viz., the *Red Astracan.* For beauty nothing surpasses it during the whole season, while its delicate bloom reminds us of the dainty grape. It is a Swedish apple, and reported to be very hardy. Its quality is good if picked before it becomes mealy, and this is just where the grower must exercise much vigilant industry. The apple ripens more unevenly than any other, and must be harvested every four days for a period of two or three weeks.

The package which presents this lovely fruit to best advantage is the peach basket covered with red gauze. Baskets of well-selected specimens of this apple have sold at 60c. to $1.00 per bushel in Toronto, when the supply was not too abundant.

The *Primate* is spoken well of by Mr. O. T. Springer, of Burlington, in the report of 1869. He says he "shipped by boat to Montreal, the Early Harvest and Red Astracan, followed by the Primate and Early Strawberry; they arrived in good order, and realized the highest market price. He found the Early Harvest liable to crack and spot, and would plant the Red Astracan in preference. He thinks the Primate a good apple for shipping, a good bearer, firmer than the Early Harvest and a better bearer than the Early Strawberry; it can also be shipped a little greener."

I now present a list of the more prominent varieties of summer apples for market in the order of ripening: The *Early Harvest, Red Astracan, Sweet Bough*, Golden Sweet, Benoni, Early Joe, *Early Strawberry*, and Primate. I have written in italics those which I think most profitable in Western Ontario.

And now I conclude this paper by again stating my belief, that to the fruit grower who is wholly given to his profession, there is profit in having apples to market at all seasons, notwithstanding that sometimes he may meet with discouragements in the way of very low markets, or partial failure of his crop.

Mr. Gott —Summer apples are grown very largely with us. Almost every person has them; and as soon as they are ready to sell the market becomes glutted with them. If the grower is careful, and can get his apples into the local market early they will be very profitable, but if not they will not.

Mr. Croil.—I have not found the growing of summer apples profitable. They are too perishable. We prefer waiting for the later ones.

Mr. Dempsey.—Have you any variety sufficiently hardy?

Mr. Croil.—St Lawrence is our favourite early apple.

Mr. Beadle.—Have you none earlier than that? Isn't the Red Astrachan about a month earlier? We have it. It is nearly a month earlier.

Mr. Dempsey.—What varieties have you tested there, Mr. Croil?

Mr. Croil.—I have purposely avoided the early apples with the exception of the St. Lawrence, and, I think, one or two trees of the Red Astrachan. The others, I have found, were not profitable.

Mr. Bucke.—A gentleman has a small orchard near Ottawa of the Duchess of Oldenburg; and he claims they are a very profitable apple. He says he never had a tree killed, and he can get fruit in advance of anything he can get from the States. He has not a great many barrels, but he says he could sell a thousand bushels if he had them, and that they would be worth from three to three and a half dollars a barrel. They are ripe about the first of September, I think.

Mr. Beadle.—Early in September with us. I should think it would be about the middle of September with you.

Mr. Denton.—Yesterday I passed Mr. Kettlewell's orchard, and the Duchess are the only trees he has bearing this year. The others are perfect failures. He said the Duchess was the most profitable variety he had.

Mr. Beall—A remark that was made by Mr. Beadle just now is, I think, calculated to lead some persons astray. He said that with him the Duchess of Oldenburg would be ripe by the first of September, but that farther north, where Mr. Bucke lives, it would not probably be ripe until the middle of September. The implication would be, of course, that the farther north we are from the Lake shore, the later the fruit will be. Now, I think that it can be shown that that is not a fact. I have a large number of the Duchess of Oldenburg, and I cannot keep one on the tree—I have not one for sale when the first of September comes. They are all ripe and all gone before that time. About the first week in August they are quite fit to take to market; and I get a good price for them. I generally get seventy-five cents a bushel for all the Duchess of Oldenburg I can grow. Anywhere along the Lake shore they are a fall apple, and I generally class them as a fall apple. I attribute what I have stated to the fact of the climate being drier near the Lake Shore. I grow the Red Astrachan and the St. Lawrence also.

Mr. Bell.—I have planted a great number of Early Harvest trees, and I have never had one grow. I have now two or three trees which I bought for something else, but which I believe are Early Harvest, and they are doing pretty well.

Mr. Gott.—There is another early summer apple that is found to be very profitable and very beautiful out west. It is called the Tetofski. I believe it is an apple of Russian origin. It is an apple of good quality, quite solid, a good shipper, and a very abundant bearer. It comes very early.

Mr. Beall.—I cannot allow the remark with regard to the Tetofski to fall without adding a word. I would not recommend any man to have more than two of the Tetofski. I think that would be the outside that any man should have. They are early; they are a beautiful apple; and in fact they are a very nice apple; but in a week or ten days

from the time they are eatable they are entirely gone. They are not worth anything. They are dry and mealy. They are not fit for anything but just for amateur use.

Mr. Graham.—The Early Harvest is about the only apple I have had any satisfaction with. I have got Red Astrachans; but there are very few of them that have borne anything. Those are the only two varieties I have in bearing. The Early Harvest is a fine variety. I think it is profitable. I prefer it to the Red Astrachan.

A Member.—Is there a variety of apple that ripens earlier than the Early Harvest?

Mr. Gott.—The Tetofski ripens before it.

Mr. Dempsey.—The Grand Sultan, grown on the same tree with us, ripens before it—about two hours.

Mr. Wright.—In our colder climate it is only the earlier varieties that we can grow. I do not want you to take what I say as law and gospel in regard to the hardiness of trees, as I have not yet had much experience. I have had great difficulties to contend with in trying to get fruit to grow at all in my section, for various reasons. In the first place, when I would go to a man's orchard and find a tree that was tolerably hardy and bearing tolerably good fruit, and asked him what variety it was, he knew nothing about it except that it was an apple. So far, the hardiest apple tree which I have found is the Wealthy. I find it hardier than the Duchess of Oldenburg, about which we hear so much. Next to the Wealthy I would recommend, so far as my experience goes just now, the Peach of Montreal, and the Mackintosh Red, which grows at a place called Tindale, back of Cornwall, where it originated. None of these varieties have been killed with me yet. Still, I have only been growing them three years, and that is not long enough to test them. The Peach of Montreal I find a very early apple, but you must understand that varieties of apples that would do very well with us I would not advise other sections of the country to use at all. If anyone can grow apples which last for a week, that is enough, because he can sell in a week all the apples he can grow, especially if they are an early apple. The Peach is an early apple; but it would not do for anyone to ship, it bruises so easily. The Tetofski comes very early, and with us it is all right; but it does not last very long. It drops very much from the tree. We lose a great deal of fruit because of its dropping before it ripens. Still, we always have a tolerably fair crop. The Wealthy keeps longer than any other apple grown in our part of the country. This year every tree of it is bearing heavily. Not one of them has ever been winter-killed in any degree. Another variety which I think is going to be very hardy, and which I think will prove better than either of the two I have been speaking of, is the Yellow Bellflower. It is not very handsome, and it does not look so well as the others; but it comes in sooner than they. I do not think the Red Astrachan is going to do in our part of the country at all. I have an Alexander that I think is going to live. I am in hopes it will prove hardy with me. There is another variety called the Magog Red Streak which has proved very hardy with me, and which I think will last in our climate. But before all—before the Duchess of Oldenburg, before any other variety—I would place the Wealthy apple. I think it is the hardiest and best apple for a northern climate that we have ever had anything to do with. Next to that I would place the Mackintosh Red. The Wealthy keeps longer than any other apple I grow.

Mr. Croil.—I quite agree with Mr. Wright that there are very few kinds that succeed in our neighbourhood at all. I think I might almost limit them to a dozen. The Mackintosh Red has been thoroughly tried in our neighbourhood. I have seen the original tree. It is now seventy years old, and it is bearing yet. But ahead of all the other apples as a hardy variety is the Fameuse.

Mr. Wright.—I might mention with regard to the Mackintosh Red that not only does it stand the cold, but in other respects it is the hardiest I ever saw. I can grow it where I cannot grow the maple trees at all.

Mr. Dempsey.—I wanted to ask you if you had ever fruited the Irish Peach. You spoke very highly of the Montreal Peach; I would like to know whether it is the same apple or not?

Mr. Wright.—I do not know; I never heard of it.

Mr. Bucke.—Might I ask Mr. Croil where the Mackintosh originated?

Mr. Croil.—In the county of Dundas.

Mr. Wright.—The Mackintosh Red has kept with me till the middle of winter without any trouble, and is about as handsome an apple as anyone would want to put on any table.

Mr. Leslie.—I find the Peach of Montreal to be the same apple identically that we have had for years called the Indian Rajah.

Mr. Denton.—I find that the general crop of apples around London is greatly a failure this year. I would ask whether that is general or local, and what is the cause of it?

Mr. Young.—I am afraid the apple crop will not be so abundant as we were in hopes it would be.

Mr. Beall.—In the neighbourhood in which I live the apple crop will be more abundant than was ever known before, judging from my own observations and from the reports I have got from a large number of small growers.

Mr. Young.—Do you grow apples there extensively for market?

Mr. Beall.—No.

Mr. Dempsey.—Have you had any experience in growing apples for drying or for cider?

Mr. Peck.—I do not think that our summer apples have been converted into cider or dried; for they have not been raised that extensively here, and what have been raised have been consumed at home or shipped off.

A Member.—Do you classify the St. Lawrence as a summer apple?

Mr. Peck.—We do not. There have not been any places for making cider here until last fall.

Mr. Dempsey.—The object in introducing this question was to ascertain in what way we can convert our surplus early fruit in a manner sufficiently remunerative to encourage us to cultivate it.

Mr. Bucke.—I do not think that summer apples, as a rule, are grown in any quantity by anybody.

Mr. Dempsey.—There are localities where they cannot grow any late-keeping varieties of apples; they are confined to the growth of summer varieties. Why this is the case I am not able to tell you; but it occurs to me that the earlier in the season the crop of fruit is removed from the trees, the better the opportunity that is afforded that tree to mature its wood and to be prepared for the severity of the winter. But if the fruit is removed early by people living in the sections of our country in which the climate is more severe, they are in danger of getting a surplus of these early fruits. I would encourage the growing of the early varieties in such sections as this, where we can grow the later-keeping apples such as they cannot grow successfully in such localities as Ottawa and Renfrew.

Mr. Bucke.—The time has not arrived yet when we grow so many apples in the northern section of the country that we cannot use them.

Mr. Matheson.—I would like to know whether the summer apple is suitable for drying purposes. I have no doubt the varieties of apples mentioned by Mr. Wright, particularly the Duchess of Oldenburg, can be grown as extensively there as in any part of Ontario; and whether that apple can be used for drying is something I would like to know.

Mr. Dempsey.—Is there any person present who has attempted to dry early apples

Mr. Mallory.—The St. Lawrence is a very superior apple for drying. I have tried it. I have no acquaintance with the Duchess of Oldenburg.

Mr. A. M. Smith.—I have never had any experience myself, but I have heard the Duchess of Oldenburg mentioned as a very good apple for drying by a person engaged in the evaporating business.

Mr. Wright.—I would like to know if there is any way of protecting fruit trees which are not quite hardy enough for our section of the country. I have had a good deal of experience in protecting trees, and the result of it has been to lead me to believe that the more they are protected, the worse they are off.

Mr. Francis Peck.—I live north of Peterboro'; and I was told that if I took some of the tender varieties and tried to make them hardy, I could do so; but my experience is that you cannot make them hardier.

Mr. Wright.—I may mention one experiment I tried. I thought that if I could protect the main trunk of the tree, the rest would perhaps live. So I had my man go to work and make a lot of hay wisps such as come around bundles of cutlery of the sort that farmers use, and I wrapped the fruit trees in my ground around with these from the earth up to the top. The next spring when I took that hay off the tree I could see like a spiral groove going up the tree where the wisps of hay had gone round. It was black wherever the hay had not touched; and there the bark was as green and fresh and nice as could be. I tried that two winters in succession, and I found that my trees were worse off instead of better.

Mr. Beadle.—I would like to ask Mr. Wright if the snow falls at his place in time to prevent the frost from getting into the ground to any depth.

Mr. Wright.—Oh, we have any amount of frost. It goes right down through the snow and everything else; and sometimes it comes long before we have any snow. The only thing I have found to do any good is to draw muck and put it around the bottom of the trees. That prevents the frost getting in so soon. The frost breaks through and tears the roots all asunder.

Mr. Beadle.—In our climate we are not troubled about tender apple trees; but we sometimes have things in regard to which we are in doubt as to whether they will stand even that climate—more particularly ornamental trees; and we find that by mulching the ground with barnyard litter we succeed in keeping the trees hardy enough to bear the winter. It is a fact that is well established with us that many trees will perish from the cold of winter because their roots are kept so solid and so hard during a long period of time that the trees die; but if we can succeed in getting them to live until they root out into the moist soil below the frost, then we often succeed in getting them to grow, and live, and bear our winters well. The theory that we have in regard to this is that the cold winds and frosts of winter are always drawing up by evaporation a certain amount of moisture from the tree although it may have no leaves on it.

Mr. Wright.—This experience is entirely different from my own. We have adopted an entirely different plan. If we allow the roots to go down the frost will tear them right asunder. So we have to try and prevent the roots from going down; and in order to do that we adopt this plan:—We get a large pine tree—as large as we can—and saw slabs off it about three inches thick and thirty-four inches wide; we lay these down in the ground and lay muck on top of them; then we plant our tree on that, and raise it up as high as we can. The object of doing this is to prevent the roots going down any further, so that when the frost heaves it will heave all up together, and not go through this tearing operation. Then we have a mound around each tree in the fall.

Mr. Beadle.—Supposing you were to keep the frost out from around the tree altogether by a species of mulching?

Mr. Wright.—We cannot do it. The frost will go down there four feet. The mercury freezes in our part of the country.

Mr. Dempsey.—It often occurs that there is a variety of pear or something else which we would like to grow, but which proves a little tender. I have found on my own grounds that some tender varieties of pears that I have grow very well if they are on the north side of a hardier foliage, and in a very thick clump. I cannot grow the Beurre de l'Assomption at all when exposed; but set beside other varieties in the way I mention I find it very hardy.

Mr. Wright.—That is my experience too. I may mention that on the grounds of the Fruit and Floral Company at Arnprior they have as fine a specimen of the Flemish Beauty as I have ever seen, which blossoms every year, but has never any fruit on it.

Mr. Bristol (Picton).—About fourteen years ago I set out about 150 apple trees. Yesterday I went down and took a sort of inventory of them, and I assure you I felt a great deal discouraged. There were 156 trees altogether. I set them out in 1868; and at present there are fifty-two of them comparatively healthy, forty-nine unhealthy; and fifty-five dead and gone; and some of the fifty-five trees have been planted over and over again. Throughout the whole orchard the bark turns dark. I can show a specimen. The speaker produced and showed a specimen of a branch of a tree diseased in the manner he described.)

Mr. Mallory.—Mr. Bristol's experience has been about the same as mine.

Mr. Dempsey.—What is your soil?

Mr. Bristol.—Principally limestone gravel, rather low, a portion of it is sand. It is a little point of land that runs into the Bay. Perhaps it would range in depth from about twenty inches up to four feet.

Mr. Dempsey.—Does it frequently dry out?

Mr. Bristol.—It does in the summer.

Mr. Dempsey.—Do your trees start to grow again in the autumn?

Mr. Bristol.—I have not observed that. My Greenings have grown hardier than they were. The Northern Spies have all looked healthy up to this past year; and now they are all affected by this same disease of the bark growing dark. I had one young tree just beginning to bear last year, as healthy as I ever saw; it grew in six feet of soil near my house. This spring I went to it, and four inches above the ground it was perfectly dead—girdled. I manured it pretty well.

Mr. Dempsey.—Did you ever search for insects?

Mr. Bristol.—I have searched, and have never found anything. I have been told that the trees show signs of sawdust; but I have never seen anything of the kind. I have frequently taken my knife and pared off a foot of bark, and found no insect. The trees are fully exposed to the north wind.

Mr. Beadle.—Have you noticed whether, if in the spring of the year, you dig a hole there two feet deep in the soil, it will fill in with water?

Mr. Bristol.—No; no water ever stands there.

Mr. Saunders.—I think if Mr. Bristol will look under the bark of that sample he has brought here he will find plenty of evidences of the work of the borer, which clearly points to the fact that the injuries have been caused by it in that piece of tree. But I do not understand whether the unhealthiness of which Mr. Bristol complains is to be attributed altogether to the bark difficulty, or whether it may not have been caused this year by a fungus on the under side of the leaves which is very prevalent around London this year, and which I have noticed here too. The leaves, I have observed in a good many instances, are now falling off. This bark injury I think may fairly be attributed to borers; and the proper way for Mr. Bristol to proceed to prevent it in future would be for him, about the months of June or July—before the time the borer appears—to coat the trees with a solution of soft soap thinned with a water solution of washing soda to the consistence of thick paint and applied with a brush. The alkaline wash forms a coating over the bark and destroys the eggs of what insects may be about it, besides preventing the borer depositing its egg on the bark.

Mr. Dempsey.—You who live in the country can just as well set up a leach and thin your soft soap with lye.

Mr. Saunders.—Lye will do. The idea is to get the alkaline strong enough. Lye alone might be too strong, but would do with soft soap. If you just put lye on the trees, the first shower will take it all off, but if you mix it with soft soap it will dry into a kind of varnish on the tree. You require a dry day for applying it in order that the preparation may dry. The season for applying these things would vary for different districts. The insects would appear later in the Ottawa district than with us. The egg state lasts somewhere about a week; and if this wash is applied any time during the existence of the egg state, it destroys the eggs. As a preventive measure the application needs to be made before the insects appear. When the eggs hatch the young grubs burrow through the bark into the interior to work between the exterior bark and the sap wood, and when they once get in there you cannot do anything with them.

Mr. Denton.—I would like to ask Mr. Saunders if in this disease he refers to, the leaves curl before dropping off?

Mr. Saunders.—Yes.

Mr. Mallory.—In respect to what Mr. Bristol says, there are some who seem to think the trouble is from a borer or an insect. I have watched this thing carefully for ten years, and I think I can safely say it is no insect that can be seen by the naked eye which causes it. In the first place a small spot appears on the side of the tree. The next year this extends to a circle of an inch or two. It will take three or four years per-

haps before it completely destroys the tree. A sort of water blister forms inside the bark. The only remedy that I can find is, as soon as you find this blight take an axe and cut the spot right out. If you do that it will not extend around the tree. I have a Spitzenburg in the middle of the garden on the very best of soil, and that is affected the worst of any tree I have. In the first year or two the bark adheres tightly to the wood, and there is no appearance whatever of insects inside.

Mr. Carr.—It is my opinion these gentlemen grow their trees too fast, and they are caught in the fall when there is too much sap in them. There are places where you may grow your trees as fast as you choose; but by growing them too fast in those exposed places so that the frost gets at them when there is too much sap in them the whole difficulty is caused. This insect is the result of a worm that has worked there since the tree was dead. This solution of lye and soap is a splendid thing to kill anything like lice or insects, but that it will prevent this difficulty, I do not think. I think less manure and more care in getting your tree hardy is what is required. It is those trees that put out long shoots and extend their growth until fall that are most likely to be affected.

Mr. Dempsey.—I had a tree affected by the borer, of which there are two kinds. This tree was a Yellow Bellflower, It was attacked near the fork of the branches. The tree was nearly half destroyed before I discovered it. I had the parts nicely cut out, and then through applying this alkaline wash the tree has become perfectly healthy. Mr. Saunders will tell you how the different species of borers operate in the tree.

Mr. Saunders.—I think my friend who has just spoken has not observed the workings of those insects, perhaps, as carefully as he might do or he would know that borers are not particular. They will attack trees that are diseased quite readily, but they will also attack healthy trees. I lost at first a great many trees from borers. After beginning to use this alkaline wash it was very rarely indeed that I saw any of the effects of their working. The disease in this specimen that Mr. Bristol has brought is evidently the work of a borer, but whether that borer has deposited its eggs on the tree after the bark has been discoloured or before, it is impossible to say. It often occurs that the sun scalds the bark in spots, and in many instances no doubt the borer deposits its eggs in the neighbourhood of these partly diseased parts; but if it has nothing bnt healthy orchards to work upon it will work upon them just as well as the bark that has become injured in that way. As far as the borers are concerned, I think the alkaline wash will check them.

The Convention then entered upon the discussion of the question: "Is Orchard Culture in the County of Hastings and adjoining counties profitable?"

Mr. H. F. Young (Trenton), promised to send in a paper on the subject. He also took occasion to observe:—I think if we set out proper varieties and take proper care of them, and then look for markets in which to dispose of the fruit, apple growing not only in these counties, but in almost any other county is profitable. It all depends upon circumstances whether it is profitable or not. In our counties, I believe, it is particularly so. I doubt if in any section of the country apple culture would be more profitable than in these counties. I have no doubt there are many gentlemen engaged in apple culture in this district who do not find it profitable, but that is simply because they have not got suitable apples. Their soil is not adapted to the culture of that fruit, or they do not take proper care of their trees. I have no doubt the climate will enable us to make apple culture in these counties very profitable. My orchard is the most profitable part of my farm—I think a hundred per cent. more so than any other part of it. Last year I had some trees that paid as much as ten dollars each, and I plant a hundred trees to the acre.

Mr. James H. Peck.—I have not had practical experience in this business except during the last three or four years. I cannot speak from my own experience so much as others in the neighbourhood. I agree with Mr. Young that fruit culture, where you have proper soil, proper varieties of apples for the foreign market, and even our local market, and where you can produce such apples as Northern Spies, American Golden Russets, Swaar, Rhode Island Greening, and Baldwins—although Baldwins here have been somewhat tender, I agree with him that under such circumstances fruit growing here is profitable. Until about twenty years ago we had not much fruit here except the common or ungrafted fruit. Apart from the few apples that were used for cider and the few that

were dried, many rotted on the ground. Now there are vinegar shops, where apples can be sold at from fifteen to twenty cents a bushel, so that money is made out of what used to go to waste. Our good winter varieties have commanded very good prices, and the yield has been amply sufficient to reward the fruit grower very well. Many of our fruit growers, I think, have realized more out of their orchards than they have out of their farms—that is, the orchards yield more clear profit, with less expense. Then, since we have been sending to the old country, some shippers have been realizing good returns. While I am on my feet, I would like to ask if there is any one present who ever shipped any fruit to South America. A gentleman with whom I was in conversation advised the farmers of this section who had good fruit to ship it to Brazil. I said it had to pass the equator, and the consequence would be that the fruit would spoil. He gave me the name of some gentleman—I think somewhere about Hamilton—who had shipped a cargo of apples to Brazil, and who had found that when they got there, two thirds of them were spoiled. They were packed in about the same manner that apples are packed to ship here. However, he sold his apples at twenty dollars a barrel—those that were in good condition—and realized a very good profit out of the transaction. If apples could be selected with greater care, and perhaps papered, it would be found a source of great profit to ship them there. About five hundred of my apple trees are Fameuses. I have the same difficulty to contend against that most have in this part of the country—that is, the operation of the borer. We cannot fight it very well. I think the remedy that has been described by Mr. Saunders is the only correct one. I think that fruit is the most profitable crop that our farmers here can raise, that it will return the most money for the smallest outlay.

Mr. George Arnold (Trenton).—From my experience, I think that apple growing is very profitable in this county. I do not know very much about it in the County of Hastings. Plant the hardy varieties, and they are very profitable. There is no mistake about that. There are several varieties that we cannot hope to plant at all. My opinion is that the Ben Davis is a very profitable apple; also the American Golden Russet, and several others that I could mention that are good bearers. The great object at the present time is to plant the varieties that are good for shipping, that will stand the voyage. The Northern Spy is a very good apple, yet it is not so good to stand the voyage as many others. I think there is no doubt that the cultivation of the apple is a profitable business, and will become more so. The demand is getting larger every year, and the cultivation of the fruit will be more profitable in the future than it has been in the past.

Mr. Francis Peck.—I was born and brought up in this place, and moved to the back country. I thought I could raise fruit there as well as here, but I found it could not be raised there, and I came back here again. My idea was to put out a large orchard, principally for profit. I did so, and have now had my trees out eight years. I had Snow apples last season from trees that bore two barrels on the average, and I sold them for a dollar and a half a bushel at home. I do not know of anything else that would pay me anything like that. I put out principally the Snow. I grew the trees north, and I very soon found out there the hardy varieties. I raised principally the Snow, with the Astrachan, St. Lawrence and Tallman Sweets. The Astrachan, St. Lawrence and Snow apples were the only hardy ones that would grow at all north, and when they did grow there, the trees would not produce anything like what they would here. I have out somewhere about 1,900 trees. I have been grafting this past winter. I grafted 1,800. I have a new apple that I got three years ago, called the Star, that I am much taken up with. It is very hardy, a vigorous grower, and the apple keeps as well as any, and has a first-class flavour. The only objection was that the tree did not bear much, and I was dubious about growing it on account of that; but a neighbour of mine, when he got some of them, grafted them on another tree, and he said they then bore heavily. The Ben Davis is a profitable apple, bears well, but is very poor in flavour. As for profit, I do not know anything that pays as well. I believe we have as good a section of country for growing apples as any in the Province.

Mr. W. R. Dempsey (Aldboro').—I was sorry to hear from my friend from Picton that he had experienced such a failure. My experience is that there is more money and more fruit in the Colvert apple in our locality than in any other variety. Our ship-

pers to England find it one of the most profitable for their purposes. It turns out one of the best fall apples, and it realizes a good price. With me, among winter apples, the King of Tompkins has succeeded among the best. The Baldwin is also one of my best. I find that our success depends upon the cultivation and the soil. I believe that my friend from Picton has been sowing grain in his orchard. The Russet that Mr. Peck refers to is growing on a sandy loam. I believe that it succeeds very well there. But my Russets, grown in a limestone soil, are a failure. They get a good lot of blossoms in the spring, but I get very little fruit, and even the fruit that I do get is of an inferior quality. They are the American Golden Russet. I would not plant any more of them on my soil.

Mr. John B Williams (Bloomfield).—My soil is loamy, something of a dry nature, though very deep—you can dig probably twenty-five feet in it. The dry years do not affect the trees very much. Almost all varieties of apple will grow on this soil; but I have a variety of soils in several orchards. Some is a heavy clay soil. I have not succeeded on that as well as on the others, although it is on the same farm. On that I planted 300 Rhode Island Greenings, and there was only one tree lived of the whole. They grew well until they got to be five years old, when a warm rain coming in the fall, they continued to grow, and the leaves continued on them until the early frost came. In 1878 there were three days in November that the frost was very severe. Some of the trees sprouted the next year, and I thought they would recover. But the next year was also very severe, and they were destroyed entirely.

Mr. President Dempsey.—What is the probable profit from orchard culture in your experience, taking into consideratien all the failures?

Mr. Williams.—The Golden Russet I find very profitable. It stands at the head. I think it was about ten years ago that I planted an orchard of about 100 trees. I think four years ago I got 150 barrels of apples from it. This went up to 170 or 180 barrels; last fall I got about 150; and this year they are setting very nicely. This was on about three acres.

Mr. President Dempsey.—After planting, how long would it take three acres of orchard to pay its own expense and begin to yield you a profit; and after it does begin to yield you a profit, what would be the probable percentage of profit?

Mr. Williams.—The profits are increasing gradually. I think in about six years I realized from the three acres about $100 in fruit; and each of the two last years the three acres gave me about $500. I have succeeded very nicely with the Bailey Sweeting. For shipping, I have realized about as much from it as from anything. I would recommend for planting in this section, the Golden Russet, Ben Davis, Northern Spy, Talman Sweet and Bailey Sweet, and the Westfield Seek-no-further. I have tried the Wagener very extensively; and it appears to blight in the summer, something like the pear. It stands the winter all right. I have tried the Yellow Bell-flower, and it is all right, and has been all the way through. I have some 500 trees of the Duchess of Oldenburg. I sell the fruit from them in Montreal. I shipped some to Glasgow, and they went through very nicely. The Duchess of Oldenburg is giving me great satisfaction. I have found it profitable. I have tried a great many different varieties of apples, and I get more pounds to the bushel of the Duchess of Oldenburg than of any other variety I have ever tried. The American Golden Russet I generally call the English Golden Russet. I see it is laid down in some of the American catalogues as such.

Mr. President Dempsey.—I have observed, in this section of the country that, apples succeed on soils that nothing else will grow on. I was in company with Mr. Young, last fall, driving through the County of Hastings; and I discovered an apple tree there that was beautifully loaded with fruit, nearly every specimen of which was first-class, although it was growing on a drifting sand, near a pine stump, from which the sand had been blown away, and the necessity of using a stump extractor being thus avoided. I find, almost invariably, where fruits have failed, or where parties have not succeeded in orchard culture, that they have selected a site either where the soil was too shallow or where it was so heavy that it would maintain a late autumn growth. I think that if you observe this point particularly, this discussion will lead you to be fully convinced that this is the cause of so many people failing to make profit out of orchard culture. Mr. Graham is succeeding in introducing apples upon a heavy soil; but the position is

wonderfully elevated; and we find that Mr. Williams is succeeding on a loamy soil of immense depth; but it is sufficiently dry to produce a good healthy growth, and it retains a sufficient amount of moisture to maintain the growth during the season. Just below this, in the heavy land, he lost his Greenings. I fancy that, if we give more attention to the site when we are selecting an orchard, we can let the choice of varieties be a secondary matter.

Mr. Young.—I remember the trip we had, which you have spoken of; and I think both of us learned something. It is a fact, that we found trees flourishing on sand, and also a fact that we fonnd trees flourishing, and paying their owners very well, on very heavy soil. So that nothing was proved after all but that apple trees are not very particular about what soil they grow in. Perhaps it may be, that there are really but two or three questions for us to decide. First of all, I think, we must have a dry soil; one which is naturally so, is preferable to a soil which is artificially drained. The soil should be hard enough to retain the moisture necessary for the nourishment of the trees, and yet not so hard as to hold too much water. If the bottom is so hard as not to allow the water to go through, I think the trees will die away gradually. I have trees growing on a quite loamy land, and some growing also on a land which is quite stiff, and they are all doing well; but the land is well drained. It is not artificially drained; it is a porous soil. If people have not soil which is right, they can make it right; but it will cost them something to do so. If we have soil in these united countries that is suitable for apple culture, apple culture will be profitable; but if we make a selection of the proper soil and the varieties of apples are not suitable, we shall make a failure. I firmly believe I have over-cultured my own trees. I never grow grain among my trees. I have about ten acres of an orchard; and I cultivate about a third of it—what we call summer-fallowing. I run a gang-plough through that frequently—sometimes every week, if it is a growing time; but I do not cultivate much below the surface. I know of an orchard which is suffering for want of cultivation; and not only one, but scores of them. I believe people make greater mistakes in that way than in over-cultivating. Both the soil and the climate are very well adapted for the cultivation of the apple in these counties.

Mr. Graham.—You mentioned, Mr. President, that my apple orchard was in an elevated position. I have apples, too down in the valley. I have a Golden Russet that stands in drifting sand; and I picked four barrels of Golden Russets, as nice fruit as ever saw, off it last fall.

Mr. Sing.—How long is it well to allow apple orchards to remain in grass?

Mr. Young.—If you allow an apple orchard to remain too long in grass, the tree will produce very few apples. If you leave the trees in timothy, for instance, for a number of years, I believe you will eventually ruin your orchard.

Mr. Carr.—Will mulching do instead of cultivation?

Mr. Young.—Yes; it will to a great extent.

Mr. Mallory.—I have always been very sanguine that orchard culture was very profitable, from what I have seen of apples. My own experience has not been very profitable. The trees that have been the most profitable to me are those that are standing in low ground. I have had finer Snow apples and more of them in a low, wet piece of heavy clay, where, in the spring, the water stands up on the trees until the frost comes out several inches, although in planting them, I planted them right on the surface and made a pretty good rise to have them up rather high, than I have had anywhere else. My Talman Sweets, on a loamy soil, where it was dry and sunny, were a failure.

Mr. Burrard.—The orchard pays just in proportion to the amount of care and labour bestowed on it. I was noticing yesterday, in riding through Prince Edward, that many of the orchards that have been let go to grass are done. We have an orchard of about ten acres, and in it nearly all the different varieties of soil are found, the sandy loam, the heavy clay, the black muck, and the gravelly; and there are varieties of trees that would do well on all of these different kinds. The great obstacle in the way o raising all fruit is the want of sufficient care in its cultivation. Cattle are let run in orchards, browsing trees; and the trees are sure to freeze during the winter. Last year we had abundance of all kinds of fruit, even peaches.

Mr. Beadle.—Where is your locality?

Mr. Burrard.—In Prince Edward.

Mr. President Dempsey.—In the little trip I was speaking of, last fall, with Mr. Young, we visited one orchard which was in grass, and it was surface-manured. It was rather a light soil, and the man had made an effort to take a crop of beans off a small portion of the orchard. I presume the percentage of orchard occupied by the beans would not amount to a tenth of the whole area; and there was more fruit on that little spot that was occupied by the beans than there was on the whole of the rest of the orchard. I concluded that that was quite an argument in favour of the cultivation of the orchard. There were portions of that orchard where the trees were actually shedding their leaves before the fruit was ripe. I visited the same orchard last year and found the trees loaded with fruit—an immense quantity of Seek-no-furthers; and we found those Seek-no-furthers, early in October, lying on the ground already. The leaves had not only matured but the fruit also. Mr. Dempsey told you about his orchard of Colverts. He had one hundred Colverts which were planted in 1863 or 1864. Those hundred Colverts, or what he has left, produced 237 barrels the year before last; and those sold for $2.50 per barrel. I never could make any money out of a Colvert yet; but he does. We live close together too.

Mr. Beadle.—Mr. Mallory succeeds in growing fine trees and fine crops of fruit in a very low, wet soil. I do not want any gentleman present to go away with the idea, however, that that is the way to plant out an apple orchard. I do not know what the secret is there; but I know from years of experience and observation that apple trees or fruit trees of any kind planted in a cold, wet soil where their feet are wet and cold all the time, will in a little while die.

Mr. Arnold.—I think the gentleman told us the trees are only ten years old. I think, if we come down here ten years from now, he will tell us a different story.

Mr. Mallory.—I did not wish to leave the impression that that soil was a good one on which to grow apples. The water goes away quickly after the frost comes out.

At half-past twelve o'clock the meeting adjourned until two o'clock.

Upon the opening of the afternoon session the President appointed a committee to examine the fruits and flowers on exhibition, consisting of Mr. Bucke, Mr. John G. Peck, and Colonel McGill.

PROFITABLE VARIETIES OF STRAWBERRIES.

The next topic, "What varieties of strawberry are most profitable?" was introduced by a paper by Mr. A. M. Smith, which was published in the *Canadian Horticulturist*, vol. 5, pages 196-198.

REPORT OF COMMITTEE ON FRUITS EXHIBITED.

City Hall, Trenton, July, 1882.

The Committee on Fruits exhibited at the summer meeting of the Fruit Growers Association of Ontario, have the honour to report :—

STRAWBERRIES.

Mr. A. M. Smith, of St. Catharines, showed a number of varieties, amongst these were Late Cone, Glendale, Windsor Chief, New Dominion, Early Canada, Sharpless, Bright Ida, Belle, Little's Seedling (No. 5), Arnold's Pride (No. 23), Miner's Prolific, and some mixed varieties.

Little's Seedling, No. 5, is a peculiar berry, of an exceedingly deep red color, with much indented seed pits.

New Dominion holds its already high place as regards size and color.

Bright Ida, rich looking and beautiful.

Windsor Chief, medium size, firm, and well colored.

Sharpless, not uniform in size, though some berries very fine.

Your committee regret much that owing to the late heavy rains, the flavour of the above varieties could not be very well tested.

Mr. Charles Arnold, Paris, showed a curious sprout produced by hybridizing, the stem of a strawberry bearing thirty-four berries on it. The fruit was of no great value.

GOOSEBERRIES.

Mr. William Saunders, London, exhibited three of his hybrid gooseberries: These were a cross between Warrington red and the wild prickly variety—both parents are hairy to prickly. The largest of these was of good size with very stiff hairs, verging on prickles; the second lot were smooth, and also of good size, as large as Downing; the third was a small berry and showed the peculiarity of having two berries, which are smooth, attached to each fruit stem. All three varieties are heavy bearers, as showed by branches to which the fruit was attached. Of course at this season the fruit was unripe.

R. Kettlewell, London, Ont., sent four varieties of gooseberries—White Smith Roaring Lion, Downing and Houghton. They were all well loaded and free from mildew or other disease. He also showed some handsome specimens of the Red Cherry Currant and sprigs of Quinces.

RASPBERRIES.

Mr. A. M. Smith, St. Catharines, placed on the table a basket of the Highland Hardy raspberries, quite ripe.

Kettlewell and Warden, London, Ont., sent some handsome plates of roses, set in moss, to decorate the tables, but the gem of the exhibition was a magnificent bouquet, arranged with much taste and presented by Miss Dempsey, the fair daughter of the President, made of flowers gathered on his grounds. The flowers were principally roses interspersed with very fine spikes of doutzia crenata.

Respectfully submitted,

P. E. Bucke,
Col. John McGill,
John G. Peck.

Mr. Arnold.—I fruited the Early Canada this year for the first time, and I think I am safe in saying, so far as my experience goes, at any rate, that it is the earliest strawberry grown. It is earlier than the Early Hudson. I think it is earlier than Metcalf's Early. I have not had much experience with it, and I would not like to speak of any other quality than its earliness. What I want is earliness. Let me supply the early berries and I do not care who supplies the others.

Mr. Beadle.—How did Arnold's Pride succeed with you this spring? Did it kill your Arnold's Pride?

Mr. Arnold.—Yes. All strawberries suffered pretty much alike with me. I do not know of any one variety that suffered much more than any other. The Sharpless, I am somewhat inclined to change my mind in regard to. I was very severe on it last year. However, it has one fault: the berry is always white on the end. But the plant bears a few very fine berries indeed.

Mr. Beadle.—Do you cultivate yours in hills?

Mr. Arnold.—No.

Mr. Beadle.—Then you will never get any crop.

Mr. Arnold.—I think a strawberry ought to take care of itself.

Mr. Beadle.—How did Bright Ida succeed this year?

Mr. Arnold.—As I said before, no strawberry succeeded well with me this year.

Mr. Bucke.—What do you call your number eight?

Mr. Arnold.—That is the Alpha.

Mr. Saunders.—Mr. Honsberger is in the room I believe. If so, I would like to hear from him about the Early Canada.

Mr. Honsberger.—This is the second year that I have fruited it to any considerable extent. Last year I fruited an acre of it, this year four acres, and I have found it to do very well. It has not done near as well this year as it did last on account of frosts and other things. There appear to be quite a number of crippled berries; and there has been so much wet that the berries have been soft, which is a fault that all varieties of strawberries have had this year. The Early Canada has suited me very well. Like Mr. Arnold I feel that if I can supply the early berries, I do not care who supplies the late ones; and I have found that with it I have been able to make two or three good shipments before there has been any other strawberry in the market at all.

Mr. Denton.—How does that compare with the Wilson?

Mr. Honsberger.—Last year I grew the Wilson and the Early Canada side by side, and the Early Canada yielded a bigger crop than the Wilson. We had them seven or eight days before the Wilson last year, and picked them two or three days after. The plants were the same age, received the same cultivation, and were in the same soil—sandy loam.

Mr. President Dempsey.—What other varieties have you?

Mr. Honsberger.—At present I have none but the Early Canada. I have been growing a large number of other varieties, but the most of them would come in too late to suit me. I was very much impressed with the Charles Downing. I came to the conclusion that that would be more profitable for me to grow than the Sharpless on account of its ripening earlier than the Sharpless. It was not so large as the Sharpless; but it would ripen up uniformly. I found the Connecticut to be profitable on account of its lateness.

Mr. Saunders.—More so than the Dominion?

Mr. Honsberger.—I do not know that they were more profitable than the Dominion. As a rule the Dominion is too soft for shipment, though I have shipped it as far as Montreal. For a late berry for a local market I like it well and have done well with it.

Mr. Gott.—There is one variety—there are two varieties, I might say, that have been developing in our neighborhood this year, and are giving us great satisfaction. One is called the Duncan. It is a very excellent fruit and ought to be very profitable. Another new variety, called Warren, is going to give us great satisfaction. It is inclined to be soft, but it is going to be very profitable.

Mr. Beadle.—I do not grow strawberries for market; I grow them for the plants. One variety which Mr. Smith speaks of as planting for market—the Glendale—I notice is very disparagingly spoken of by others in articles I read; and I was just comparing in my mind what they say with what Mr. Smith says. What they say of it is that it is a very tart berry with very little flavor—one which is rather soft for long shipments. Perhaps Mr. Smith will set us right about it.

Mr. A. M. Smith.—I have the berries here. (Mr. Smith produces a sample of the variety in question).

Mr. Bucke.—Mr. White of Ottawa grew last year several varieties of strawberries, and he found the Crescent seedling was the best—the most profitable—yielded the greatest number of berries; and it is the only one that has really stood the winter with him. But I think it requires some other berry to grow near it, because there is not sufficient pollen on the berry to fertilize it.

Mr. A. M. Smith.—I think the Glendale will speak for itself. In regard to being a solid berry for shipment, I would only recommend it as a late berry.

Mr. Wellington.—I am like Mr. Beadle; I do not grow for the fruit as much as for the plants. Still, at the same time, I have some opportunity of testing them. Unfortunately last season the grubs got into our plants so badly that many of the new varieties that I thought we should have raised for the first this year got eaten up. The Manchester and the Bidwell I had hoped to be able to speak of from experience, but I cannot do so. I think the Sharpless is a profitable berry. I found in Toronto this season that

while other berries were bringing 15 cents a basket the Sharpless were bringing 40. Of course you can only get such prices in large cities. I notice that the Triomphe de Gand is being sold at from 30 to 40 cents a basket, while the other varieties are almost done in the cities. I believe the Early Canada is a berry that we shall hear more favorable reports of each year. I believe it is a berry that will commend itself on account of earliness. One of the main points with men who are growing berries for profit is earliness. Even if it is inferior in quality, the early berry will sell well.

Mr. Beadle.—Have you fruited Captain Jack?

Mr. Wellington.— Yes, Captain Jack is as productive as the Crescent; if it were possible I would say more so. It is of good, uniform size, a good grower, and, I think, a good shipper. The Duncan is a good berry—very good appearance—even—good flavor, and, I think, a good shipper.

Mr. President Dempsey.—We have a large collection of varieties of strawberries. With respect to the Duncan, we have it growing in company with a large number of varieties, and allow me to say that it is very productive It produces apparently more berries than foliage. The berries literally hide the foliage. It should, I think, have high culture, or rather pretty strong land. The Sharpless is just the opposite of that. It produces a large amount of foliage. We have a Sharpless setting very near the Duncan and the first year we fruited the Sharpless it was on very strong land—garden soil. We expected to get berries near the size of a man's fist; but we failed to get any berries at all. We removed the plants afterwards to poorer land, and we find that the Sharpless is now giving perfect satisfaction. I would hate to throw it away. I believe it is going to be very profitable. It commands very high prices in the market; nearly double what the Wilson or almost any other variety will. I admit the truth of what Mr. Arnold said—that it has almost always a green end; but almost anybody who has any pride about him in picking strawberries puts that end down (laughter). Last year we had done up a few cans of every variety of berry we grow for the purpose ef testing them, and next to the Wilson stood the Sharpless. I do not know which I would put first. There are several varieties of strawberries that are very much praised which I would never advise you to can. I have not the names with me. We plant largely of Wilson's Albany, and intend to until we are satisfied there is a berry more profitable than it. We have planted this year very extensively of the Crescent seedling. Invariably we plant it with the Wilson—two rows of Wilson and about six of the Crescent. I planted the Early Canada last spring. We never planted it before. We planted the Wilson's Albany at the same time. We also planted the Bidwell at the same time; and the Bidwell produced a few berries. The Early Canada produced a very nice crop for the first year's planting, and the Wilson's Albany also produced a very nice crop—just about an equal quantity—and I could not tell the difference between the flavor of the fruit. And I believe I would be considerably troubled to tell the difference between a basket of the Early Canada and a basket of the Wilson; but the Early Canada appeared to be a little earlier than the Wilson. The Bidwell matured with the Early Canada. I do not think the Bidwell is going to be a firm berry for shipping; from what I saw of it I thought it was soft. I thought last year that Arnold's Pride was the most profitable berry that we had on our ground. I think Mr. Arnold remembers me saying that I thought we could pick it with a scoop. I never saw so many berries on my plants as I saw on those. But this spring the plants were dead. The blossoms were not killed, because the plants were killed before them. It was a very severe winter, however. The other three varieties of Arnold's have stood the winter well.

Mr. Arnold.—Was it growing beside any others? Was there anything peculiar in the ground?

Mr. President Dempsey.—To the one side was the Great American, and to the other side, I think, was the Glendale. There were only some two or three plants that survived. But you could not judge of strawberries from last winter.

Mr. A. M. Smith.—I had Arnold's Pride planted with the other varieties and just adjoining the Bidwell. And the foliage came out as healthy—in fact ranker—than that of either of the others right alongside of it. I have fruited the Bidwell; but I hardly know which it is. I sent to Mr. Lyon, President of the Michigan Horticultural Society,

for the Bidwell plants a year ago last spring, thinking that as he was the originator of the variety I would have the Bidwell sure if I got the plants from him ; but to my surprise there are four different varieties of berries growing on the same plants. I think I can tell from the cuts what the Bidwell is ; and there were not any of what I took to be the Bidwell as early as the Early Canada, though they were perhaps a little earlier than the Wilson.

Mr. Arnold.—I never like to speak of varieties that have only been planted one year ; but the idea that has crossed my mind when I have passed by the Bidwell is that it bids well for runners and nothing else. There is no fruit on it in comparison with the others ; but the runners are immense. I think that New Dominion has hardly got its due. A few hours before I came away from home I picked it with several other varieties, and a more showy box of berries could not be seen, and no white ends as in the Sharpless. And as for cooking, it is one of the best berries I know.

Mr. Bucke.—I do not think strawberries ought to be cooked at all.

Mr. Allen.—(Goderich).—We have several large growers ; but they stick to the old Wilson ; you cannot turn them from it. I noticed this year one of the growers left one patch of the Wilson to ripen better than he usually does. It is a notorious fact that the Wilson is pulled too soon ; and I do not wonder at the complaints in the city markets of the poor quality of the berry when it comes to the table. It is pulled before it is ripe. They do not wait until it assumes that dark hue which is natural to the berry when it is properly ripe. We grow the Crescent seedling and the Sharpless, and the great point against the Sharpless is just what Mr. Arnold has stated. In every other respect it is a fine berry. The Triomphe de Gand has been a great favorite with us, and is still a favorite. We have one dealer who grows that and nothing else. He grows it just to supply the local markets around there. It will not ship a great distance. The Bidwell has been grown around there a little, but I have not heard anything of it.

Mr. Beadle.—What was the result of allowing those Wilson's to get ripe ?

Mr. Allen.—He told me the result was that he got more in the local market.

Mr. President Dempsey.—If he sent girls out to pick the Wilson, how would he manage to have only those picked which were perfectly ripe ?

Mr. Allen.—Of course that would be a difficulty. He had to watch the bed.

Mr. Edwards—(Belleville).—The Wilson is the berry I have made the most money out of, and I have tried a great many.

Mr. President Dempsey.—In this section of the country there are a great many persons cultivating the Colonel Cheney. It is a very profitable berry if you have plenty of soil and the soil is pretty rich ; but be very careful if you can to prevent wet weather coming on at night during the time you are picking them.

Mr. Beadle.—Don't you find the Colonel Cheney is very deficient in pollen ?

Mr. President Dempsey.—Yes.

Mr. Saunders.—I have been growing the Colonel Cheeney during the last three or four years beside the Wilson and Sharpless, and I think on the whole it gives us better crops than they did.

Mr. Beadle.—But you have plenty of pollen from the Wilson. The Colonel Cheney is almost a pistilate variety—there are some anthers on it—and would require some other variety to fertilize it.

Mr. Wright.—I have grown the Colonel Cheney ; but I always plant it between the Triomphe de Gand and the Wilson's Albany, and then I have no trouble at all in growing it.

FERTILIZERS FOR SMALL FRUITS.

A discussion on the question, "What are the most desirable and economical fertilizers for small fruits," was then introduced by the reading of the following paper by Mr. Bucke :—

Gentlemen : Having been requested to read a paper on the most economic fertilizers for small fruits, I may state that any manure is suitable for these plants that is adapted

to the soil on which they grow. The only small fruits which require special fertilizers is the strawberry, which does best by a treatment of bone-dust and ashes, or phosphates. The ordinary barn-yard manure, being apt, especially if too largely applied, to make the plant run to leaf instead of fruit.

I have indicated above that the manure should be suited to the soil, as much as to the plant grown upon it, and as this is one of the fundamental principles of vegetable growth, a few remarks on the treatment of soils, and on plant life, may be more interesting than a disquisition of special fertilizers.

I believe the discovery of the remarkable power of the absorption possessed by arable, that is cultivated soils, is generally attributed to Baron Liebig, the great modern German agricultural chemist. It is now demonstrated that the food of plants cannot exist for any length of time in solution in the earth. It is therefore certain that there cannot be a circulation of such solution towards the roots, these must go in search of food. Hence it is necessary, if it is wished to arrive at an adequate idea of the requirements of plants in the shape of nutriments, to study the growth and ramification of their roots.

If therefore the food of plants is not held in solution in the ground it will easily be seen that those portions of the soil traversed by the numerous rootlets will, to a certain extent, be exhausted of its plant-sustaining elements, whilst the immediate adjacent portions, where no roots have penetrated, are rich in them. Should it be necessary to grow a succeeding crop of equal value in all parts of the same field, it will be necessary to mix the exhausted and unexhausted particles of the soil by mechanical means, and to add certain manures or other chemical compounds, to supply what has been removed by previous crops. In order to do this properly it is necessary for the cultivator to understand the nature of his soil and sub-soil.

In the upper surface of the soil are found all the required elements for the production of plants to supply the wants of man and the animals that subsist on them. These elements are accumulated by the absorptive power of soils, and it is this absorptive power which removes from solution the soluble salts required for the fertility of the soil. For instance, it is well-known that charcoal, as an absorbent, is used in most filters, and in the same way animal charcoal is employed by the sugar refiners. Arable soil is found to possess the same properties, though in a less degree. Diluted liquid manure of a deep brown colour and strong smell, if passed through arable soil, will be found to flow off both colourless and inodorous. Not only does it lose its smell and colour, but the ammonia, potash, and phosphoric acids which were held in solution are almost, if notquite withdrawn.

The fertile particles which are attracted to the soil through which they were passed with the fluid in which they were held in solution, is that upon which all plants feed. I may remark, that in using the word attraction, it is perhaps best to explain that it is not used to mean that sort of attraction which causes the needle of a compass to point to the north, but merely a chemical affinity which the soil has for particles which form food for plants.

It is by the vital process of vegetation that the stems and leaves of plants are formed by the food the plant feeds upon. All the foods for the support of plant life are formed in the mineral kingdom. The cosmical conditions of vegetable life are heat and sunlight. The gaseous elements which are absorbed by the leaves of plants are in continual motion in the air. The co-operation of the cosmic and chemical conditions, form the perfect plant. I merely make these brief remarks on the action of manures on soils and the growth of plants, so that some idea may be had as to the way plants are acted upon by artificial stimulants which are given to the soil by the cultivator. In a paper of this nature I must necessarily be brief, as it would take up too much time to point out the attractive force of different soils. It may be laid down as an axiom, that the power of a soil to nourish cultivated plants is in exact proportion to the quantity of nutritive substances which it contains in a state of physical saturation; but all soils will not, and cannot, be made to retain these substances in the same degree, as they have not the same absorptive requirements.

For instance it will be found that a loose sandy soil, and a heavy clay one, possess the absorptive power in the smallest degree.

One of the principal requirements of the fruit grower is to know the cause as well as the means for making the nutritive substances of the soil available for doing their work.

The presence of moisture, heat, and the free access of air, are the best conditions under which the nutritive substances can be put in a fit condition to be absorbed by the roots of plants.

A certain quantity of water, with the aid of carbonic acid decomposes the silicates and makes the undisolved phosphates soluble through the soil—but stagnant water on the other hand excludes the access of air and prevents the generation of carbonic acid—so that it will be seen manures are much assisted by having the soil in a fit state to receive them.

In examination of the question as to the best or most economic manures for small fruits, I have come to the conclusion, the best manure for the soil the cultivator has to work upon, is the solution to the question; as any soil which will produce good vegetables or good farm crops, will produce good small fruits. For these, as well as for the production of any other part of the vegetable kingdom, the earthy phosphates should not be lost sight of in imparting productiveness to land.

The so-called superphosphates are phosphates which have been treated with sulphuric acid. On land, poor in clay and lime, the superphosphates are specially suitable. But on chalky soils, free phosphoric acid and sulphuric acid are at once neutralized, thus depriving them of their essential properties, which are their ready diffusibility, as it is this which renders them so valuable as a manure for other soils.

Amongst the natural phosphates, bone-dust holds the first rank, and probably the best mode of reducing bones is, to expose them to a high pressure of steam, under which they lose their toughness, and swell up into a large gelatinous mass which, when dried, may be readily ground to a fine powder. In this form the bone mass spreads rapidly through the soil, and dissolves slowly with water without requiring any other solvent. Bone charcoal of the sugar refineries makes an excellent manure, but requires to be ground to an exceedingly fine powder to be available. It is a good plan to mix the bone-dust with farm-yard manure, and let the whole mass ferment, when it should be immediately transferred to the soil.

Manures, as a rule, are still on trial, both on this continent and Europe; but the question has long been settled by the Japanese husbandmen.

The soil on the mountains of Japan is composed of a fine brown clay, that of the valleys, a black, loose, deep garden mould. The clay strata of the mountain, owing to the copious rain-falls, give rise to innumerable springs, which may easily be collected without any great skill, and turned to account for purposes of irrigation.

The hills, with their rock strata, about Owen Sound, which I saw during our drives at the summer meeting there last year, put me in mind of the springy hillsides as described in Japan. In that very flourishing empire, the climate of which is very similar to Florida in the United States—the warm summer months are employed for growing rice, sugar, and cotton, whilst during the cooler season of winter wheat and vegetables are grown.

Whether the present fruitfulness of the soil in Japan is simply the product of cultivation extending over several thousand years, or whether its fertility existed from the beginning is not material, the clay of the diluvium, the mild climate and abundance of water, give all the requisites for a thriving cultivation, and these advantages have all been turned to account by this industrious, ingenious and sober people. The Japanese have thoroughly mastered the difficult task of maintaining their land in the highest state of cultivation. Society is divided into seven classes in that country, and the sixth, or lowest but one, is the farming class. There are no agricultural schools, societies, nor academies, and no agricultural press. The son learns from his father, who, in his turn, learned from a previous generation. The system of agriculture in Japan is a positive knowledge, which ages have shown to be true, and there is nothing else to be learned in it.

One of the peculiarities of Japanese husbandry is, that their religion—Sintoism and Buddhism—forbids the eating of flesh, and not flesh alone, but everything derived from animals, such as butter, milk and cheese, thus disposing of the principal objects for which cattle are raised in Europe. Even sheep would not pay, if reared for the wool alone. The consequence is, the whole empire is arable land, there being no pastures, and all the

manure produced, with the exception of the ashes derived from burned straw and refuse vegetable matter, must pass through the human system before being returned to the soil. The dense population, and the small holdings, which consist of farms of from two to five acres, require the utmost care and attention of the cultivator, to secure the greatest crop which it is possible continuously to raise from year to year. As no cattle are used, all the cultivation has to be done by hand.

The manure is carefully collected and stored in large earthenware tanks, of a capacity of from eight to twelve cubic feet. These are let into the ground nearly to the brim, and during rain are carefully covered, but are exposed to the heat of the sun. The only mixture added is water. When the tanks are full, having been intimately mixed from time to time by stirring, it is left, according to the state of the weather, to stand from two to three weeks longer, or until required for use; but under no circumstances is it ever used in a fresh state. Collections of manure are made from every available source, and the towns are carefully explored, to give their quota to the rural districts. Thousands of boats may be seen early each morning loaded with high piles of buckets, full of the precious material, returning through the various canals, which extend far into the country.

Besides this mode of conveyance, in the evening long strings of Coolies are met on the road, having in the morning carried their produce to market, and are now returning to the country laden with two pails of manure each. Caravans and pack-horses which have brought fine manufactured articles, such as silk and lacquered goods, a distance of two or three hundred miles, from the interior to the capital, return freighted with baskets and buckets of manure. By this means a perfect circulation is kept up of the forces of nature, and no link in the chain is ever broken.

In Japan, manure is applied in a liquid state to the growing crops, and no crop is grown if a sufficient quantity of manure is not at hand to fertilize it with. If the life sustaining principle is not in the cultivators tank the crop is not sown. In this and all European countries the grain and other products are brought to market, but nothing to compensate it is returned, consequently the force to produce eventually gives out, and production is reduced.

Under the Japanese system of agriculture one would suppose the crops would be of an exceedingly luxuriant character, but such is not the case. There is nothing extravagant in the appearance of the Japanese crops. But what does distinguish them most, as compared with our own, is the certainty and uniformity with which they have been produced for thousands of years. If facts are required to prove this assertion, it may be stated that the empire covers a similar area to that of the British Isles; but owing to the hilly nature of the country only about one half is fit for cultivation. Yet they have a larger population than Great Britain and Ireland, and still they maintain themselves without obtaining food from other countries, as is the case with the United Kingdom, which imports many millions of dollars worth, in the shape of meat and breadstuffs, etc.; and since the opening of its ports, Japan is actually exporting large quantities of food.

In Japan all crops are grown in drills, which are so arranged that, during the same season several crops are produced from the same piece of ground. For instance, in the middle of October a field of buckwheat will be found planted in rows of from twenty-four to twenty-six inches apart, the intervening, now, vacant space had been sown previously with small white turnip radishes, which have already been gathered. This space is now being tilled with the hoe, as deep as is possible, by the implement employed. A portion of the fresh earth is raked from the middle of the row up to the buckwheat, now in full flower. A furrow is made between the rows in which the gray winter pea is sown, the seed is then manured and carefully covered with soil. By the time the peas are two inches high the buckwheat is ready to cut, a few days after the rows where it stood, are dug up and sown with winter wheat or turnips. Thus crop follows crop in grand and endless procession, month after month, and year after year, as there is no season which is not suitable for the growth of some sort of produce. If however, there is a deficiency of manure, the interval is left fallow. What wonderful ingenuity and appliances would it require in this country to keep up such a strain on our soils? Yet, these half-civilized creatures, which our most enlightened chemists and cultivators would look down upon with contempt, have solved the whole problem of supply and demand, keeping their land

in the highest state of cultivation, without in any way exhausting it, *and with only one kind of manure.*

The Japanese system which, it will be seen, is much assisted by the climate, prevents the manure from lying idle for any length of time. There is no doubt the row system, whether applied to fruit, garden or field culture, is the proper course to pursue for all kinds of cultivation, and where this plan is followed the soil should be made mellow, and turned several times with the digging-fork during the growing season of the crops.

It will be seen by the above remarks that the application of manure alone, although a very important factor in the growth of plants, is not the only thing required in raising a perfect crop. The aerating and mechanical manipulation of the soil, so that the rootlets may be prmitted to pass easily through the soft earth in search of the vital forces of nature, are quite as essential as plant food. The conditions described cannot, under the present system of ploughing, harrowing, and cultivating, be attained in any degree of perfection, as the soil requires to be acted upon in a rotary instead of a longitudinal way to give the required seed-bed an after treatment, and I believe that when steam cultivation, which is in the near future, is employed, it will revolutionize the working of soil in quite as great a degree as the spinning jenney, and the sewing machine have changed the old methods of making and working up fabrics. A time also must certainly come when some convenient and easy method will enable the more civilized nations to secure and employ effectually the forces of nature, which at present seem to waste, rendering our rivers and streams impure and unhealthy. When that day arrives, a balance will be found in the laws of supply and demand for the requirements of land which will have the effect of making our globe a much larger and more fitting sustaining power for the human race than has ever been dreamed of by Malthus, or any of the old world philosophers. The economic application of steam to agriculture will give largely increased crops at a minimum outlay, as the expense of horse-flesh, horse-feed. and men to attend and care for them, is like fences, a tax on agriculture which few, who have not looked into the matter, would care to contemplate. Without being much of a prophet, I venture to predict, that though the present century has not many years to run, it is altogether probable its crowning and greatest invention will be the application of steam to husbandry.

Mr. Arnold—I would like Mr. Bucke to tell us which are the best manures that are manufactured in the country.

Mr. Bucke.—Well, I say that superphosphates are good for strawberries.

Mr. Beadle.—I spent about thirty dollars for a ton of superphosphates made in Guelph, and I tried it on a great variety of things—carrots, onions, strawberries and corn, and I thought it was of about as much value as so much sand. It was not worth the labour of putting it on. A neighbour of mine tried some that was made in Boston (Bradley's Superphosphate), and I must say that where he applied it, it seemed to have stimulated everything he put it on to a most magnificent growth. Why there was this discrepancy between the phosphate manufactured in Guelph and the phosphate made in Boston I cannot tell. His strawberry crop, where he applied Bradley's superphosphate, was certainly very fine, but no better than I have seen produced by the use of common barnyard manure mixed with bone dust. I believe if we would take ground bone and make our own superphosphate out of that we would save a good deal of money which we now pay for gypsum and sand which are put in to make up weight. I believe we are humbugged most egregiously by these patent manure makers. I was told by a member of this association that we could make our own superphosphate if we would put bones in a barrel and cover them with plaster of Paris or ashes and then wet them thoroughly with potash. By that means you will get the bones soft so that they will mix up with anything that is added to them. I have never tried the experiment yet, in the way which Mr. Gilchrist (that is the gentleman's name) mentioned, and I give it to the society today in order that members may try it. I think we can grow more and larger fruit by the use of superphosphate than we do now.

Mr. Peck.—Will Mr. Beadle be kind enough to give the quantity of ingredients necessary?

Mr. Beadle.—Mr. Gilchrist did not give me any particular quantity; he just said to put enough gypsum in with the bones to cover them, and then pour in your solution of potash, enough to thoroughly wet it. The action of the potash on the bones would dissolve them.

Mr. Carr.—Has anyone tried diluted sulphuric acid?

Mr. Beadle.—Yes, diluted sulphuric acid will dissolve bones.

Mr. Drury.—I think if an experiment were made by some person with the different manufacturers of artificial manures, applying them on the same soil and under the same conditions, it would be more satisfactory than to have different persons trying them under different conditions on different kinds of soil. We are all aware that with common land plaster different results will be produced on different kinds of soil. I am not so sure as the Secretary seems to be that the Guelph superphosphates is a fraud. These high priced manures are very often a fraud, I think; but I am not satisfied that an experiment which is conducted without due regard to the details should be taken as conclusive. My experience in this matter has led me to think there is something behind all this diversity in results that we have not got at yet—in the use of these artificial manures especially. I know perfectly well that in growing clover some years the investment of money in land plaster is a good one and yields a very fair return; and then other years it is used and no result is produced at all.

Mr. Wright.—Several of our customers wanted us this spring to bring in some superphosphate, and we brought some from Brockville and sold to them, and as yet I have not found one of them who has observed any benefit from it. I have some two or three boys in the village to whom I give twenty-five cents for every barrel of bones they bring to me. I put these bones in barrels and cover them with water and ashes, and it is not long before they are perfectly eaten up by the ashes. In that way I get splendid manure—just the thing for my roots and small fruits.

A Member.—Tell us how you apply it for melons.

Mr. Wright.—I put in the seed first, and then cover it with muck, and then put on the bone dust. I keep the bones over from one season to another—about nine months.

Mr. Bucke.—The Boston phosphates are not nearly so good as the Canadian phosphates. They mix our Canadian phosphates with their best phosphates. There is no better phosphate anywhere than there is in Canada.

Mr. Saunders.—I think the main objection to the Guelph phosphate is that it has too much sand in it. I was one of the judges on this subject at London; and I put a magnifying glass to that phosphate and could make out the grains of silica in it. I asked the man how the sand got in it, and he could not tell me. He said his boss could; but I never got any explanation.

Mr. Arnold.—I am inclined to think there is something in these phosphate mines. I noticed Mr. Brown, the manager of the Guelph farm, speaks in one of his reports very highly of these Brockville phosphates; but he has not a word to say in favour of Guelph so far. I fancy he discovered the sand as well as the rest of them. There is a great effort made by these Brockville people to introduce their phosphate, and they sell it in our locality at five dollars a barrel. I put bones in my manure heap with ashes above and below them, and I found in the course of a few weeks that it was a very nice paste. I thought it was a very nice manure; but I could not say what the results were.

Mr. Drury.—There is a source of manure that I think is neglected by our farmers to a great extent throughout the country, and that is a cistern near the barnyard to receive the drainings from the manure pile. I noticed when in England that every well regulated farm had such a cistern. The contents are taken out regularly, and by an arrangement similar to what is on a watering cart is sprinkled over the fields. I have used such a cistern, and I find the best results from it. During the last two years I had a very good opportunity of observing the way this waste was going on, having seen some of the best farms throughout the western part of this Province; and I noticed only two farms where there was provision made for avoiding it. I believe that if we collected this

manure and applied it most of us would find that we had in it a supply almost sufficient for our wants, especially so far as the garden and orchard are concerned.

Mr. President Dempsey.—I have experimented a little with these artificial manures. One year not many years since we used three tons of the Canadian superphosphates—the mineral superphosphates from Brockville, and I could not see any practical result from it. The season proved very dry, and the phosphate was applied a little too late, I thought. However, I fancied I did see a marked result on the crop of the following year. I never saw fit since that to invest thirty-five dollars in that quantity of manure. I thought it was too much money thrown away. Some years ago we used to collect all the bones we could and break them up a little on an anvil with a stone hammer. It was something like work, however, to do it. We diluted one part of sulphuric acid with three parts of water, and that would dissolve the bones in the course of a few days. That we mixed up again with perhaps double the quantity of bones, and one barrel of it was worth five of this superphosphates we got from Brockville. I tried the first superphosphate which was manufactured by Cole of Montreal, and it gave me the best results of any superphosphates we have tried yet. That was a number of years ago. I have tried some that was manufactured by P. R. Lamb of Toronto, and invariably we have had good results from it. After a time Mr. Lamb adopted the idea of mixing part bone superphosphates and part mineral superphosphates—and there is a good deal of sand about Toronto too. Let us bear in mind that so long as a barrel of bone dust weighed 150 pounds it was all right, but, just as soon as we found the weight of a barrel of bone dust get to 250 pounds, it ceased to be worth the same amount of money. When you get a barrel of bone dust that weighs more than 150 pounds, you are paying for something besides bone dust. There are advertised now small mills for crushing bones. If we could get something like that, we would soon be able to dissolve the bones with hardwood ashes. I have never seen one of those mills. I have produced large pears by means of artificial manure, and sometimes won some prizes through the use of it; but that manure was nothing more nor less than sulphate of iron dissolved and applied to the soil in a liquid state. If you feel a little too lazy to do it in that way, pulverize the copperas and sow it over the soil. We sow four or five pounds around a tree. When we apply it in a pulverized state it does not all dissolve at once. If we use it in a liquid state, we are a little more cautious. In experimenting with these artificial manures a few years ago we cultivated peaches, pears and apples in boxes, and, having in this way perfect control over our trees, we could readily observe the effect that the manures had upon the growth of the trees, and we found that nothing gave as much satisfaction in the case of the pear as sulphate of iron. I remember showing a Belle Lucrative pear to Mr. Barry of Rochester, and he could not recognize it. It was grown all out of form. Finally he asked me what it was. I said it was a Belle Lucrative. "My dear sir," he said, "if you can grow such Belle Lucratives as that in Canada, grow all you can of them." I grew Josephine de Malines also in that way. Josephine de Malines can be recognized by anybody, and he recognized it, but he did not know how I could produce such a pear. It was produced in just the way I have stated—with copperas water.

A Member.—Have your trees blighted any since you commenced to use that?

Mr. President Dempsey.—I do not remember seeing any trees blighted since I commenced using that. You will pardon me, however, if I do not propose any remedy for pear blight. We have tried for strawberries bone dust, superphosphate and ashes separately, and we have tried the whole three together, and we have tried two of them together, and we have had just as good a result from common wood ashes as we have had from the whole of them, or from any one of them, or from any two of them combined.

Mr. Beadle.—Will it pay to buy potash and water your strawberry plants with that?

Mr. President Dempsey.—No; it will never pay a man to buy potash, so long as he can get ashes for ten cents a bushel.

Mr. Beadle.—But we cannot get them for less than twenty-five cents a bushel.

Col. McGill.—I find that one of the strongest manures that I can use is five parts of mould to one of hen manure, with one part of roasted lime to loosen the hen manure. You have got to be very careful what quantity you use, because it is almost, if not quite, equal

to foreign guano. I think, if we can get hardwood ashes at ten cents a bushel, it pays better to use that than any of the artificial manures.

Mr. President Dempsey.—We have been advising the Government of Ontario to establish, in connection with the Agricultural College, a laboratory, which would enable them to analyze any fertilizer which we might see fit to purchase; and if that recommendation is carried out, I do not see why we should not be willing to send them a sample of any manure we might buy at any time, and if it did not come up to the claims of the person selling it, I do not see why we would not be justified in prosecuting him, just the same as we would a person who should sell us a barrel of flour which was partly made up of sand.

Mr. Beall.—I was reading an article on artificial manures lately, which I am sorry I did not read more carefully, it bore so nearly upon this matter. It was written by a gentleman in England. He said that superphosphates, as well as all others of those patent manures, if they were honestly put up, were pretty much what they were guaranteed to be—that is, they would all have the good effects promised for them by the persons getting them up. But the great difficulty was in the farmer not knowing where to apply them. He went on to say that probably three fourths of all the artificial manures which were applied in England were put upon soils which did not require those particular kinds of manure. There is no doubt that from this time forth a man, to be a successful farmer, must understand the chemistry of the soil. This writer says that straw is the least valuable of all the manures. He speaks of landlords binding tenants not to take any straw off the land, and says it is the most foolish thing a man can do. He says he can buy manure five times as valuable for what the straw is worth.

Mr. Edwards.—Some years ago I was thinking of going into the manufacture of artificial manures, and an uncle of mine, who was carrying on the business in the old country, told me, "You can dissolve the bones with common sand, kept moist, just as well as you can with anything else, but it will take longer." He said that it would not pay to dissolve bones with sulphuric acid, unless I could buy it for two cents a pound.

Mr. Saunders.—This is entirely different from anything I ever heard before. cannot understand how sand can do anything but increase the weight.

Mr. Bucke.—Salycilic acid does work on the sand.

Mr. Saunders.—But there must be something else with it.

Mr. President Dempsey.—Persons engaged in the manufacture of superphosphates claim it is necessary they should use something as a precipitant, and they prefer sand, on account of its heaviness.

CULTIVATION OF THE GRAPE.

Colonel McGill read the following paper:—

GRAPE GROWING AT OSHAWA.

In compliance with a request from the Secretary of this Association, I have jotted down some of my twenty-five years' experience in grape growing. I find that good ground, deep and well pulverized, and well enriched with well-rotted barnyard manures, and a south-eastern slope is essential to success. Have rows twelve feet apart, and vines twelve feet apart in the rows. Train vines on the arbor—stake and trellis—like the latter system best. I prune in the fall as soon as the foliage falls. Trim to two buds. Lay vines down just before the ground freezes up; covering vines with a little dirt—let them remain covered until all danger of spring frosts is past. I give my vines clean cultivation, cultivating the ground two or three times during the summer. I give the ground a good dressing of well-rotted barnyard manure, and a dressing of ashes, lime and salt every other year. Don't trim in the summer, except nipping off the tips of the branches that bear grapes, at two or three leaves from last bunch of fruit; this causes new laterals and leaves to grow which is beneficial to the ripening of the fruit. I get my best bunches of grapes where the most foliage is; the more foliage the better the fruit. Have tried

laying the grapes, and think well of the plan. I have twenty-nine varieties of grapes growing on my grounds, eighteen or nineteen varieties are fruiting. Never had any mildew on vines except a little on the Burnet—two years ago had a little on the fruit of the Salem, and Clinton same year, and some on the Clinton last year also. I dusted the fruit and vines with the flour of sulphur, and scattered some on the ground under and around the vines affected. I like Rogers' No. 3, 4, 9, 15, 19, 22 and 43, much, especially 3, 9 and 22; three and nine much alike. Brighton fine, but don't bear well with me. Delaware does well—a nice little grape should be in every collection. The Hartford Prolific does well on my grounds, but drops badly from the stem; there are many better grapes to my taste. The Champion is a fine grower and bearer with me—ripens two or three weeks before the Concord—too acid for me, but sells well on account of its early ripening. Early Dawn—a nice sweet grape and early, I like it much. Worden's Seedling is the Concord over again, but ripens some ten or twelve days earlier, which makes it valuable in a cold climate. The Lady grape, or White Lady as some call it, is a very good grape, but a slow grower—requires the best of cultivation; so do the Delaware and Early Dawn vines. The Croton is a first-class grape in my opinion when well grown, but the foliage is tender and sunburns; is not profitable. Isabella grows and bears well on my grounds, but don't ripen its fruit well only in the most favorable seasons. The Clinton grows good and bears well; I use it for wine. The Pocklington is fruiting this season with me for the first time; it is a strong grower, and bids fair to be a great bearer. Planted the vine last year and it has fourteen or eighteen bunches of blossoms on it. The Burnet grows well on my grounds; has borne a few bunches of grapes for the past three years; is full of blossoms at present. Last year three fourths of the berries or grapes were not larger than small peas—they ripened and were very sweet—what few grapes did come to perfection were very good; I hope it will do better this year. In conclusion, I think, all things considered, the Concord is the grape for the people in this part of Canada.

All of which is most respectfully submitted.

JOHN McGILL.

MR. GOTT.—I would like to ask the Colonel whether, if he only pinches his main runners once, he does not find the laterals very troublesome—whether they do not rob the fruit of its nourishment?

COLONEL McGILL.—I pinch more than once; whenever they send out the second growth of leaves pinch again.

A MEMBER.—I did not exactly understand whether the gentleman breaks off everything that does not bear fruit.

COLONEL McGILL.—No, sir. I do not unless there is an over abundance of leaves. I find the more foliage I can keep on the vine around the fruit the better fruit I can have. One of the secrets of the success attending the bagging of fruit is, in my opinion, in keeping off the hot rays of the sun away from it. In my first experience with grapes I was exceedingly anxious to get them ripe, and I thought that if I could get them colored that was all that was wanted; and in order to get them colored I took the leaves off so as to let the sun get at them. Still, however, I did not get the grapes ripe —I got them colored—they were burned.

MR. BEADLE.—Have you marketed any grapes?

COLONEL McGILL.—I have.

MR. BEADLE.—Do you believe it to be profitable in your section of the country?

COLONEL McGILL.—I do. I am satisfied we have to cultivate to please the eye more than the palate. I have sold my Rogers' at from 14 to 18 cents a pound, and one man in speaking of my Champion at the show, said to me, "Colonel that is the best grape I ever ate." I said, "I am glad to hear you say so—but you are the first man I ever heard say that." I think, from my experience, that there is more money in the Concord than in any other grape. I get from six to eight cents a pound for the Delaware.

MR. ARNOLD.—Colonel McGill spoke about the foliage being necessary to the ripen-

ing of the grapes. We all admit that. I want to ask him if he thinks the foliage on the laterals which have no fruit on them improves the fruit on the other laterals?

Colonel McGill.—I leave the foliage on for the purpose of keeping the sun off the grapes. I think it is necessary to have the fruit well covered with foliage.

A Member.—Isn't it a fact that the action of the sun on the foliage affects the grape?

Colonel McGill.—Yes.

Mr. Leslie.—I wanted a little more information from Colonel McGill about the Worden grape. He says the Concord is the grape for the people, and he says the Worden is the same thing over, only that it is eight or ten days earlier. I want to know then why it is not the grape for the people?

Colonel McGill.—What I mean by saying that it is the Concord over again is that, in constitutional and bearing qualities, it is the same as well as in flavour; but it has the redeeming quality of being ten or twelve days earlier on my grounds, and that I consider a very important thing for this country. It is a comparatively new grape in Canada; but should it sustain its bearing qualities and its keeping qualities it should supercede its parent. I think very much of the Worden seedling as far as I have seen. What might do in Leslieville might not do in my grounds. My soil is strong sand loam, highly impregnated with lime.

INVITATION TO A SUPPER.

At this step, Dr. Day, Mayor of Trenton, invited the members of the Association, on behalf of the corporation, to a supper to be given in the evening in the Town Hall, in honor of the Association.

Mr. President Dempsey.—Mr. Mayor, it affords me great pleasure, on behalf of the Association, to thank you for the very courteous invitation we have received. I trust that we will, one and all, avail ourselves of it.

CULTIVATION OF GRAPES.

The discussion on this subject was then resumed.

Mr. President Dempsey.—I was not satisfied with the Colonel's explanation. He says the Concord is the grape for the million, and then he says the Worden is the same thing as the Concord, only that it is ten days earlier. If so, I say "Good-bye, Concord." I am willing to endorse what the Colonel says about the two varieties; but I do not want any more Concords when I can have the Worden. We find nothing much more profitable than the Delaware on suitable soil properly cultivated. It is very prolific; rather too much so. One thing that is requisite in the cultivation of the Delaware is that the soil be strong in order to maintain the growth of the plant. It requires more fertilizers than many other varieties do. It is liable to overbear; and we must remember that it is necessary to take off part of the fruit. By observing those two principles we may produce a very fine crop of very fine fruit which will command a fine price in the market, and which will always give satisfaction. But if yon allow the plant to overbear it is going to shed its foliage, and the fruit will be small. Some of Rogers' Hybrids are succeeding very well with us, but there are some of them that are failing. You can cut a bunch of almost any of Roger's black grapes, and without the numbers I defy any man no matter how well versed he is in grape growing, to distinguish them. On the vine he can. The people have a great fancy for a red grape in some markets. At other places they want white grapes. So I see no other way to satisfy the public than to grow those three colours. I found last year in the latter part of the season that the black grapes were most sought for. The year before it was next to impossible to sell the black grape, for the reason that they had previously fed themselves with Champion. The Concord I am not going to despise because I think we have something better, but will continue to grow what I have of it. But if we have a grape in the Worden that will mature from

six to ten days earlier in the season than the Concord—and I believe we have—then I fancy it is our duty to cultivate it in preference to the Concord, from the fact that it keeps better when it is ripe. In white grapes I have failed with some varieties that some are ready to make great claims for. One is the Martha. I do not want it at all. It is of very little value. I think Col. McGill was speaking rather highly of the Lady grape. Some people have spoken against it. With me it fruited last year, and I prized it very highly. It looks now as if it was going to be a profitable grape. A good hardy grape is something that we want, and we are at the present time looking forward to getting it. Several of those new white grapes are promising well, but they are yet to be thoroughly tested. I fruited last year on my grounds the Pocklington, and it was a very fine grape, but it shed its fruit greatly when it was ripe. You could shake it all off. I saw afterwards, however, some bunches that were sent me by Mr. Wellington, I think—at all events they came from that firm—that had been grown in another place, and they adhered quite firmly to the stem. I am looking forward to that grape as a grape of promise. My mind has been naturally changed with respect to it. I believe that the day is not far distant when the Niagara will be for sale. I do not, however, like the way in which those people are handling the Niagara grape. It looks as if we ought to touch it very cautiously. If the grape is so precious that they wish to continue to place it on trial for a dollar and a half a plant it begins to look suspicious to me. And then they make you take two hundred plants. The more I think about it the less I think of the grape. However, I have been very favourably impressed with that grape. There are some new Canadian seedlings that we should not lose sight of. There are some that are produced by Mr. Haskins, of Hamilton, that, I think, are promising very finely. There are some again that have been produced by Mr. Mills. I think they are all dark, but there are white ones produced by Mr. Saunders that certainly are very promising, and the day is not very far distant when some of them will make their mark. There are some that have been produced by Mr. Reid, of Port Dalhousie, that are very promising. One of them is a very delicious white grape about the size of the Delaware, which, I believe, is destined to make a mark yet. There is another one, a little larger, that looks to me like something very superior. We find that over the country there are several seedling grapes. I have a couple of white ones of my own that give me great satisfaction; one of them, 25, mildews sometimes, and it will overbear. It grows very strong and tall. It ripens late, but there was more money in it on my premises last year than in any two other grapes that I had. It brought higher prices in market. It produces a greater weight than any other variety we have. No. 60 is very early, but it is a small grape. I do not think it will be a profitable grape for market. It will drop from the bunch if it hangs very long. It matures with me pretty near a month ahead of the Concord. You cannot keep it till the fruit is ripe. There are many new Canadian seedlings, and I would recommend that no one be afraid to spend a dollar in order to test a new variety of our own production. Mr. Haskins does not try to make money out of his grapes; yet he has spent days, months and years—we might say—in carefully hybridizing different varieties and carefully fruiting them. He has a black grape at the present time that, I believe, produces better wine than any grape we have yet tested. That is his Abyssinian. It is a grape that I fancy would be very profitable for us to cultivate for market purposes. I rather like the flavour of it. There are some of Mr. Arnold's grapes again that have failed in some sections of the country, but in other sections are succeeding. You will find that in one locality a grape is going to succeed, and in another it is going to fail. The Brighton is a very profitable grape with us. The trouble is that I do not think it would stand to travel long distances to market. But for an amateur variety I do not think there is anything to surpass the Brighton. We have to protect almost any variety, therefore almost any of them are sufficiently hardy for cultivation here. I found several varieties frozen to death last winter, but it was an unusual winter in the lack of snow. There is only one variety that I know of, of which we lost all our vines. Locality has a good deal to do with these things.

Mr. Mattheson.—Is the Adirondac not grown in this vicinity?

Mr. President Dempsey.—I grow it.

Mr. Mattheson.—What is the objection to it as a market grape?

Mr. Dempsey.—The Adirondac is a very feeble grower. You have difficulty in getting the plant, and when you get the plant you have to use very great care to get a crop.

Mr. Mattheson.—I find the Adirondac to be quite a thrifty vine, and that it requires no special care more than I give to the Delaware or the Concord. In my estimation these varieties of grapes would probably run in this order:—Delaware first; Adirondac second; what we call in Ottawa the Chasselas de Fontainbleu is next; after that the Brighton; then some of Rogers' varieties—15 particularly, then 43 and 44.

Col. McGill.—With regard to the Lady, I like it myself; but we have to remember that we differ in taste in regard to grapes as we do in regard to eating butter and cheese. I am very fond of a sweet grape. As to the Delaware I am aware that it is inclined to overbear. And so of the Hartford. I have taken more than half off my young Pocklington this season. If I can get ten good bunches of grapes I can make more money out of them than I can out of twenty-five bunches of poor grapes when I go into the market. We have not only to prune the vine, but we have also to thin the fruit. I sometimes take the scissors and thin out the berries so as to give them more space.

CURRANTS AND GOOSEBERRIES.

The next question, "Is the cultivation of currants and gooseberries for market profitable?" was then introduced by

Mr. Beadle, who said—I have got a letter from a gentleman who says he is selling his gooseberries for three dollars a bushel. I should think that might be profitable. I do not know how many bushels he could get off an acre; but judging from the way gooseberries generally fruit I think he would get a good many. I should think he would get as many bushels of gooseberries off it as he would of raspberries or strawberries.

Mr. S. S. Potter.—I think you can grow more gooseberries to the acre than you can of any other fruit you can grow. We get from five to seven and eight cents a quart for them.

Mr. Croil.—Our friend Mr. Tait told me last year that he got 60 cents a gallon for his.

Mr. A. M. Smith.—They are quoted at from five to eight cents in the Toronto market.

Mr. Bristol.—I saw them selling in Picton market on Saturday at seven to eight cents a quart.

Mr. Wellington.—Houghton's are selling in Toronto at present at eight cents by the basket. Downing and Smith's go at ten to twelve cents. Whitesmith's have gone as high as fifteen cents. I think from the fact that gardeners around Toronto and large cities generally go largely into the cultivation of gooseberries that they must be profitable. In fact, from conversation with them I am satisfied that they are about as profitable a fruit as they can raise; and the variety chiefly planted is the Downing. Next is Smith's Improved; and in some places they raise the Whitesmith, though it is very liable to mildew. In some sections about Montreal they grow the Whitesmith without any trouble, and then in other sections near Montreal they cannot grow it at all on account of the mildew. I presume soil or locality has all to do with the mildewing. On high, dry ground, as far as I can learn, they do better than where it is low and damp. The first time I ever had it brought to my notice that the Downing mildewed was when a woman came to me with a specimen of it which was mildewed.

Mr. Beall.—I sent a few bushels of Whitesmith's to Montreal this season, and I got $3.35 a bushel for them. I have about 300 bushels of them; but this is the first year of growing; and taking them and the old ones together—perhaps 35 old ones—I think they would average about half a gallon each bush.

Mr. James H. Peck.—I raise gooseberries near Belleville—the Houghton seedling, and I have a good general crop each year. I have never had any trouble with them mildewing. The prices we get are from five to eight cents; and I consider that raising

gooseberries is a pretty profitable business. I find that my gooseberries pay me as well as anything I raise, because I have a good crop. They are generally what you would call a round crop each year—not off one year and on the next like apples. Downing's improved have borne very well; but I cannot see the size in the berries. They look to me very like the Houghton's. My English varieties are a failure; they are subject to mildew. The Hon. Lewis Wallbridge has managed by heavy pruning to occasionally escape. They think that mildew comes from moisture, and that if you prune them heavily so as not to have so many leaves on them you may escape. Occasionally a person will succeed, but there is not one that succeeds in twenty, and the foreign varieties are practically becoming extinct.

Mr. Beadle.—In regard to this matter of gooseberries I wanted to say as a fact that near the sea shore, where the sea fogs prevail, the English gooseberries can be grown to perfection; they do not mildew at all or very rarely. But when you go a little inland, away from the influence of these fogs, they mildew as badly as they do here. A gentleman of my acquaintance, ascertaining that fact, made some experiments in the use of salt. He took some grass from his lawn and spread it under his English gooseberry bushes, and then sprinkled it very freely with salt water of as great a strength as he could well get it, and he thought he had succeeded in finding a way to protect them without failure. He did succeed for years; but at last there came a year when they did mildew—I do not know whether it was in spite of his salt water, or whether he had neglected it. He was not at home when I was there, and I had not the opportunity of asking him. I believe that for growing the Whitesmith and the Crown Bob we need here a good, strong, clayey soil. I cannot grow them on my sand at home where I live. They grow small by degrees and beautifully less every year I keep them.

Mr. A. M. Smith.—In the vicinity of Niagara Falls, where they get considerable spray and have a damp atmosphere, they have no trouble in raising English gooseberries. I was told this by the gardener of the late Mr. Zimmerman several years ago; and living within a few miles of there, and being acquainted with the locality, I ascertained it to be a fact.

Mr. Matthieson.—That view is borne out by the experience of a friend of mine at Ottawa, who is in the habit of sprinkling his gooseberries very liberally with water every second or third evening. He grows very fine gooseberries indeed. I have grown quite a number of English gooseberries.

Mr. Arnold.—Our friend Saunders has several that have resisted the mildew this year, and the other bushes are covered. His berries are rapid growers, but miserable fruiters. They get on the ground. This year we have had more moisture than we have ever had, and my gooseberries generally are worse mildewed than I ever saw them; but Mr. Saunders', standing within two or three feet of the others, have not a bit of mildew on them. They are altogether superior to Houghton's Seedling, or Downing's Seedling, or Smith's Seedling. They are quite superior in size and great bearers. It is neither light sand nor stiff clay they are growing in. Salt sprinkled on the grass will to a great extent prevent mildew. My opinion is that where we can grow the English varieties without mildew they are profitable. But there is no profit in the Houghton Seedling in our section of the country.

Mr. Wellington.—I have a new gooseberry, a seedling, that was found in the first place in an old stump of a hickory tree. It was then improved, and it made such a show in the fall that the person undertook to take it up, but only succeeded in getting half a root of it. However, it was saved; and for three years now I have been watching it carefully. It is a gooseberry as large if not larger than the Whitesmith, a deep golden yellow, and a good fair quality; and as for productiveness, it is ahead of anything I have ever seen. It is not for sale yet, and will not be for another year anyway. I think it is going to be a great acquisition. It has never shown any signs of mildew. It is ahead of anything I ever saw for bearing. It is a perfect sight to see on account of the color of the berries.

Mr. Saunders.—A berry of that kind will indeed be a great acquisition if it proves to be entirely free from mildew. My experiments have been principally with the Downing Seedling and Houghton Seedling, crossing them with Whitesmith and Warrington

and Roaring Lion and Broom Girl. I have raised, I suppose, three hundred different seedlings, and I have thrown them all out but a few. I have now on exhibition here five varieties that were among the more promising ones, and two of these samples, you will see, have a little mildew on them. I would not like to throw out everything that mildews, because these do not mildew the way the English varieties do. Some of the English varieties mildew in such a way as to destroy the fruit altogether. I have been fruiting these varieties for four or five years, and they have been giving very fair results; but I do not think they will match Mr. Wellington's if it succeeds in the way he says it is doing now. So much depends on soil in the growing of gooseberries that one needs to know what soil you are growing on before you can form an idea of the comparative value of the fruit. I have two seedlings that are very interesting from a scientific standpoint as well as from a fruit-growing standpoint. They are raised from the seed of the wild prickly gooseberry of the country, crossed with the Warrington, one of the best English varieties. [The speaker here exhibited the berry in question to the meeting.] One of these retains some of the characteristics of the parent; and here is another that is perfectly smooth. Now these are both from seed of the same berry. The fruit is uniformly larger than the female parent—the prickly gooseberry—grows with us, and the berry appears to be of good quality. It may turn out to be worth propagating. The berries group heavily. The interesting fact of one parent being spiny and the other parent hairy while one of the offspring is perfectly smooth, seems to upset the theory in regard to the influence of parentage on offspring.

Mr. A. M. Smith.—I saw several of these seedlings growing side by side with Downing and Smith's Improved and the Houghton, and it seemed to me that some of them were superior in size and equal in productiveness to any of those varieties. So that I have wondered why Mr. Saunders did not have them propagated.

Mr. Saunders.—I would like to make a remark about some seedlings I saw at our President's yesterday. He has a number of new seedlings, and I think some of them are fully better than any I have produced, judging from the size. But his are growing on a soil better adapted for gooseberry production than mine are. In our market we can sell the Houghton Seedling for twelve cents a quart, and we cannot get them rapidly enough. I see them ticketed at twelve and fifteen cents a quart in all the shop windows.

Mr. Allen.—We have tried a number of the English varieties; but they have done so badly that we have given them up entirely. We grow nothing now but Downing's Seedling, the Houghton and Smith's Improved. We consider the Houghton Seedling the best gooseberry we have. It is bought up by everyone for preserving, for pies and for every other purpose for which they are used. I have seen spots of mildew on some of the berries here and there, but nothing to hurt the crop. We are selling this season at ten cents retail, and I should fancy from the cropping quality of the bush that it will do well at that.

Mr. President Dempsey.—I am satisfied that the cultivation of gooseberries or currants will pay anywhere. If our soil is not suitable for the cultivation of the gooseberry, it is for the currant. One or the other will adapt itself readily to our soil. There is no difficulty in producing two hundred bushels of gooseberries to the acre. Even at one hundred bushels to the acre, there is an enormous profit in cultivating gooseberries. Mr. Saunders has already told you that they did not succeed well on sand. We have Houghton's Seedling growing on sand that are badly mildewed now. All varieties nearly are liable to be mildewed that are grown on sand. Downing's Seedlings have very little mildew on them. They are very much more free from it than the Houghton Seedling; and I fancy they are more profitable than the Houghton, from the fact that while the Houghtons last year only brought us five cents a quart the Downings brought us ten. I would almost like to repeat here a little of the advice that Mr. A. M. Smith gave some years ago in a paper produced—in Hamilton, I think it was—in regard to the cultivation of the raspberry. He said that no man would receive such a great amount of satisfaction in fruit culture as the man who undertook to produce seedlings among the small fruits. When we commence to produce seedling fruits, we shall readily discern that we have got something superior to the parent. Mr. Bucke will tell you that he has raspberries that are superior to Mr. Saunders' hybrids, although they are a straight seedling from Mr.

Saunders' hybrids. He has raised varieties that propagate from the roots, and varieties that root from the tip. After we once cross their natural habit of reproducing themselves, we may calculate that we shall never get the same thing from the same seed again ; but we do stand a chance of getting new varieties. But I do not think there is anything like money in this—nothing further than the satisfaction. There is no question in my mind that the red currant is very profitable. However, we find that in almost every section of the country there is a difficulty in the way of the saw fly attacking the foliage. The year before last we had a good deal of the saw fly ; and last year, early in the season, before we had fruit, when the larvæ had just started from the egg, we just gave them a little shower of Paris green. It would not take over a pound to the acre at that time, and it killed every one of them. And I would defy you to find any trace of the Paris green when the fruit was ready for marketing. This year we did not find any appearance of the fly until lately. There is no difficulty in selling currants at a very remunerative price, from the fact that they are so easily picked and so easily cultivated. Really the expense of producing currants is merely nominal. I think that two cents a quart would cover all the expense of cultivating them, and half a cent would pick them, and you would be selling them at a profit supposing you only got five cents a quart. In a moist soil they will attain fully double the size that they will in a dry soil. It does not matter whether the soil is clay or sand. We cultivate the Versailles and Cherry in preference to any other for market. Some persons claim there is no difference in quality, but there is a difference in the plant. Then, again, we find the cluster of bunches on the Versailles is very much longer than on the other, and it finishes up with smaller berries. The White Grape is much easier grown than any of these varieties ; but we do not find a person wanting more than a quart or two when we place them in the market, and we find a great many people wanting a bushel or two of the red ones. I never could make any money in cultivating black currants.

Mr. Beall.—I was making a little estimate with regard to the profits of gooseberry raising ; and judging from my own experience this year I am satisfied it is a very low estimate indeed of half a gallon on every bush—say for six, eight or ten years. This is the first year of rearing with me, and I have got nearly half a gallon. Suppose the bushes are put in rows four feet apart, and that the bushes are four feet apart in the row, that gives us 2718 plants or shrubs on an acre ; and at half a gallon of berries apiece, selling at $3 a bushel, we get for them $507 a year per acre. There is less labor in cultivating gooseberries than a great many other fruits that we are growing. They want lots of manure ; there is very little other trouble. With regard to currants, there are two farmers in my neighborhood who always succeed in getting a first-rate crop of black currants, and they are the only persons. generally speaking—the others do not get enough to pay them for the trouble. Last year I went to both these places two or three times and examined them carefully to see what was the reason they succeeded so well, and I found in those two cases that the bushes were put in not more than four feet apart in the rows, and the rows not more than two feet and a half apart ; and the ground is never manured ; and nothing ever done to it except pulling out the long weeds when they cannot get through any other way. Only about a week ago I read in an English paper that a celebrated gardener in England advises that the ground around black currants should never be touched—that the bushes should be cut off every four or five years close to the ground, and allowed to shoot up again. That was exactly the practice of these two lazy persons I refer to. The soil is a rich clay. One of the men told me that one year, five or six years ago, he had a good quantity of stable manure, and he threw it in among the bushes ; but the other never did anything at all. This English gardener advises putting on as much manure as possible, but putting it on the surface and allowing it to remain there.

Mr. Saunders.—When you were speaking of applying Paris green for the destruction of this saw fly you did not mean to apply it in the dry state, of course ?

Mr. President Dempsey—Not at all. In the proportion of about a teaspoonful to a pailful of water.

Mr. Saunders.—I was recently sent a number of eggs of a parasite which destroys the saw fly. I am in hopes we may succeed in introducing them into Canada. Professor Lentner, of Albany, says they are doing their work admirably.

CELERY, CAULIFLOWER AND CABBAGE.

On the question "What is the best manner of growing celery, cauliflower and cabbage, and which are the best and most profitable varieties?" the following paper by Mr. Peck was submitted :—

CELERY.

I have grown celery for my own use only, and am not in a position to give you much information about raising it successfully. I select the best peice of sandy loam, and make it rich with manure, (hog manure is best), and plow under deep, and make furrows with plow four feet apart for the dwarf varieties, and wider for the tall varieties, say five feet, and put the plants in the bottom of the furrows, six inches apart ; if the plants are small they should be covered for a day or two, if hot and dry, then hoe and earth up as they grow—about three times during the season. Care must be taken not to earth up when the plants are wet, nor to cover the centre stalk, for if earthed up wet the stalks will grow scurvy ; and if centre stalk is covered it is liable to rot and spoil the plant. Care should be taken to keep the stalks of the plants, that is each plant, as closely together as possible. I have tried bleaching by putting a board on each side of the celery, but the celery was tough and worthless. I don't think it necessary to treat of how to grow young plants, as all seed catalogues contain all the necessary information. The dwarf varieties are the best to my taste, and of these I have grown the Sandringham, Boston Market, New Dwarf, French large ribbed, and Carter's Incomparable Dwarf, red. I can't taste much difference between the white varieties—of the red varieties that I have tried none are equal to the white in flavour. I grow the New Dwarf large ribbed principally. and like it the best, as it has less and larger stalks and little or no small side shoots. I cannot say which are the most profitable varieties as I raise none for sale.

CAULIFLOWER.

The cultivation of the Cauliflower is the same as that of Cabbage, which I give below ; and as to the best and most profitable varieties to raise, I have not succeeded in raising any variety that was any profit in it, and have quit raising them. When I had them for sale I could sell twenty-five heads of cabbage to one of them.

CABBAGE.

The plants for early must be raised under glass, either in hot-beds or green house,—which is not necessary for me to treat of—I shall therefore give my method of raising ater plants ; where most people fail on account of the flea. Take a clean piece of moderately rich land, level good with a garden rake, and sow the seed broadcast ; if a large amount is required, then rake the seed under going backward, so as to leave the surface level ; or, if preferred, it may be sown in drills with a hand seeder, which is the best if it can be had, as more of the seed will come, but care must be taken not to cover too thick—about an ounce, if good seed, is enough for a square rod. Immediately after it is sown sow common wood ashes (dry) by hand all over evenly, about a peck to the square rod ; if any flies are there they will leave. Before the plants are up the surface of the soil should be kept moist by sprinkling with a watering pot, if it becomes dry, until the plants are up—they will take care of themselves after that. I have never failed to raise good plants in this way. The next thing, and most difficult, is to select a proper piece of land to set them in—low, flat, loamy ground is the best, even should water stand on it until the first of June, it will not hurt or injure it, as I have my best cabbages on the lowest land—that is late cabbage—the advantages are on such land, (1) no grubs nor maggots to signify, (2), and most important, the ground is always moist, For the earliest planting, land must be selected that water does not stand on ; gravelly clay will grow the earliest cabbage, but will not do as a rule for late planting, as it would be too dry. High sandy loam is not good for

early planting, as the cut worm (known here as grey grub) and maggot are worse in such land. One of my neighbours, W. D. Bonter, told me that he lost about all of his early plants on such land this year. It will do for late planting, providing the season is wet enough; in fact cabbage will grow good on any land if kept continually moist and well manured, With our dry seasons I don't think the late or general crop of cabbage can be successfully grown except on low, flat, loamy land, sandy being the best, which should be manured liberally every two years, and should be cultivated and kept clean of weeds before as well as after planting. The land cannot very well be too rich. I have no experience with artificial manures on cabbage. I planted my early varieties 2 × 3 feet, and late 2 × 3 feet; some plant closer, but I could not see anything gained by it, as the heads are smaller. I never water plants when or after setting them out, for if the land is moist enough to grow them they will do as well without watering as with it. I have tested about twenty-five varieties, and prefer Henderson's Early for an early crop, and Filderkraut for later. Henderson's Early heads good, and as early as any that is worth raising, is very tender, and will stand longer when grown without bursting the heads than any I have tested—it will not do for late planting as it will not keep. I have tried the Jersey Wakefield and could never get them as early nor as large as the catalogues speak of. The Winningstadt is a hardy early, and heads as well as any, and sells well on the Belleville market—but they are about the toughest and poorest in flavour of any that I have tested. I was told by a market gardener, while attending the Toronto Exhibition in 1880, that they could not sell them on the Toronto market; Henderson's Early being sold there principally for early. I have quit raising them, as the Filderkraut is just as early, heads just as well, if not better, will produce 50 per cent. larger crop on same land, and the best flavoured and tenderest of all, except the Savoys. They will do for either early or late—mine will be ready for market as soon as Henderson's Early—and they combine about all the qualities necessary for a good and profitable cabbage. The Savoys are the tenderest and best for boiling, and the best keepers if buried, and shrink the most if kept in cellar, but I can't get them to head so as to be any profit in them—they do not sell well on the Belleville market. There is no profit in raising red cabbage with me; I raise a few for to exhibit only. For a late crop about the 1st of July is soon enough to plant the Filderkraut; I am not done planting yet, the 12th of July. Cabbage to keep must be cut when it is growing—if the outer leaves commence to rot before it is cut it will not keep. I have not been troubled much with the cabbage worm since I have planted an acre or more together, which is the best prevention against their ravages. The best and about the only practical remedy to kill them is to sprinkle boiling water on them—the first touch of it kills them—it may be done with a whisk or watering pot. Care must be taken not to put too much on, which is not necessary, as the first touch kills them.

Francis Peck.

Mr. James Peck.—When you blanch the plants for winter use do you use sand?

Mr. Potter.—No; we use no soil; we simply put the celery on the bottom of the cellar.

Mr. President Dempsey.—Have you ever tried the use of water in blanching it—freely applying water at the roots of the celery during the winter.

Mr. Potter.—My cellar is so damp that it does not require any water applied at the bottom of it. The floor is the natural rock, and it is always moist. We used to take in the earth with the celery until last season, but last season we shook off the earth and picked off the coarse outside leaves, and the celery kept better than it did before.

The following paper by Mr. Allen was then submitted :—

CABBAGE, CAULIFLOWER, AND CELERY.

HOW TO GROW THEM, AND THE BEST AND MOST PROFITABLE VARIETIES.

It is gratifying to observe the interest taken in the cultivation of the best and most profitable vegetables to meet a rapidly growing demand. Consumers are beginning to appreciate the difficult task the market gardener has, in his constant struggle to preserve pure varieties, and his efforts to please the taste and tickle the palate by the production of finer varieties in the various classes. It requires as much skill to produce an improved vegetable as a new fruit or flower, and he who succeeds in producing a vegetable that takes first place in its class does more, I believe, for the actual benefit of the mass of consumers than he who produces a new flower.

In order to grow vegetables successfully we must look carefully to the soil as a first and main essential. The soil should be rich and well manured for the production of tender and succulent plants ; a strong retentive loam with a fair proportion of sand is probably the best for cabbages. The land should be deeply ploughed in the fall, and if it is inclined to pack and become hard it should be subsoiled. The surface should be left in as rough a condition as possible in order that the new soil thrown up may be subject to the action of the weather. Plough again in the spring turning under about forty loads of stable manure to the acre. A liberal application of wood ashes will also be found beneficial and have a tendency to destroy the white maggot and other grubs which are so destructive to early planted cabbage and cauliflower. After ploughing, the ground should be well harrowed and smoothed with the back of the harrow, and rows marked out three feet apart.

For early and second early varieties the seed is sown in hot-beds from about the first to the middle of March, and for late or winter varieties in the open air from the middle of April to the middle of May. Some large growers sow broadcast and others in drills. I believe in the latter for extensive cultivation, at least, as the after work is more easily and more satisfactorily performed. The seed should not be sown too thickly. As soon as the young plants begin to break the soil sprinkle the bed with air slaked shell lime, which should be repeated again when the plants are nicely up, to prevent the ravages of an insect generally known as the cabbage flea. This must not be neglected or the entire crop may be destroyed, as these insects are very destructive, and at times very numerous at this season of the year.

The distances at which different sorts require to be planted depend upon the size which they usually attain, and the richness of the soil. The extra early varieties should be planted fourteen inches, the second early sixteen inches, and the late varieties two feet apart in the rows, and from two to three feet between the rows. The extra early should be planted out as early as the season will permit, and the late varieties from about the first to the middle of July.

In planting out, advantage should be taken of cloudy, moist weather, and in placing the plants the soil should be pressed well so as to enable them to take a secure hold of the soil. When the planting out is not done in moist or cloudy weather it is well to shade the plants so as to avoid withering or blighting of the leaves by the sun. I have known some growers in planting out cabbage and cauliflower to make openings, fill them with liquid manure from the barnyard and then place the plants up to the first leaf and draw the soil in compactly. Some use salt brine after the plants take well to the soil, which they claim has the effect of destroying the maggots that infest these plants so often, besides it assists in assimilating the particles of soil together and produces a more luxuriant growth of plant. The brine is made by putting as much salt in a pail of water as will readily dissolve and the soil liberally sprinkled with this.

The after cultivation consists in hoeing and keeping the soil clean. The motto of the successful grower is "stir the soil." Especially is this necessary in a dry season, as

thus the air actually waters the fresh dug soil; besides when the soil is kept loose and porous the air enters more deeply and this moisture is brought into immediate contact with the roots of the plants. An hour with the hoe among the cabbage plants will do more good than two hours spent in watering.

The cabbage and the cauliflower are attacked by numerous insect enemies. The caterpillars of the cabbage moth do great mischief by eating the hearts of cabbages and cauliflowers, rendering them totally unfit for use. Hand picking and dusting the plants with newly slaked lime are probably the most reliable means known by which these destructive pests can be kept in check. Some use fine road dust, and they claim with good effect. Other remedies have been tried with various results, such as dusting with cayenne pepper, and throwing hot water upon the plants. The cabbage louse proves very injurious also. Slaked lime is probably the best and safest remedy. Another very injurious insect is the one which produces what is known as "club-root." This is the most destructive disease to which the cabbage tribe is subject. It is most generally ascribed to one or more species of insects, maggots being generally found in the tubercles. Lime, wood ashes, soot, nitrate of soda, and common salt are considered to be useful applications to the soil in which cabbage and cauliflower is to be grown in order to destroy these noxious insects. It is also a good plan to dip the roots of plants about to be set out in a mixture of soot and water made of the consistency of thick paint. To this some recommend the addition of saltpetre in the proportion of one pound to every gallon of soot. When setting out, the plants should be carefully examined and any affected in the least should be destroyed. It is claimed that cabbage grown near the salt water is invariably free from club-root, from which I would infer that salt would prove a valuable addition to the soil where the crop is to be grown.

For delicacy and sweetness of flavour we have nothing in the vegetable garden to surpass a well developed cauliflower. But in order to produce perfect specimens there must be no stoppage of growth from the time the plants are set out until the head is ready for the knife. The cauliflower requires a rich soil and an abundance of water. In a dry season unless the plants are watered often and abundantly they will come out of proper form and very loose and spindling in head. In fact it is vain to look for a compact, white head unless there is a rapid and continued growth from the setting of the plant to maturity. Liquid manure should be used freely in watering, and the soil kept loose by hoeing deep. In other respects cauliflower requires the same cultivation and care as cabbage. It is also subject to the same insect enemies.

Celery is becoming appreciated more and more, so that now instead of being looked upon as a luxury it is considered almost a necessity. Nervous rheumatic people find great benefit in a free use of celery both raw and cooked. A light rich and rather moist soil is best adapted for the growth of celery, whilst one which is heavy, wet and adhesive is unfavourable to it. Light sandy loam well manured with cow dung produces good celery, provided plenty of moisture be afforded. Good peat soil, limed and manured will also produce large solid heads. In order to obtain good strong plants for setting out, it is best to transplant from the hot-bed, when the plants are three inches high, to a well prepared bed placing the plants about five inches apart. If well attended to here they will be fine stocky plants in about three weeks, when they can be removed to trenches. The trenches should be prepared beforehand by digging about two feet deep, and working in well-rotted manure and top soil about fourteen to eighteen inches. The trenches should be about four feet apart. The plants can be set six or eight inches apart in the trenches. When planting all straggling leaves should be pinched off and the plants set in firm. The after culture consists in stirring the soil often and earthing up occasionally during the summer, taking care not to allow any earth among the stems for fear of rusting them. The earthing up should be done when the stems are perfectly dry.

Celery suffers from the attacks of the celery fly, which lays its eggs in or upon the leaves and larvæ produced feed upon the leaves forming blisters. The only way of limiting their numbers is by pinching the blisters as soon as they appear, and cutting and burning all the blistered and spotted leaves that can be removed with safety to the plant. Celery is liable to canker in some soils particularly in such as contain much oxide of iron. I have seen celery blanched beautifully by placing a four inch tile over

the plant, and when it grows over the top the tile is raised and supported with earth below

The dwarf varieties can be planted on the surface instead of in trenches, and many growers prefer this method, as the plants have a greater depth of rich living soil below.

So far as my experience has gone I prefer the following varieties of cabbage, cauliflower and celery.

Cabbages, extra early varieties:—Early York, Little Pixie, Jersey Wakefield, and Early Oxheart.

Second early varieties:—Winningstadt, Henderson's Early Summer, and Fottler's Improved Brunswick.

Winter varieties:—St. Denis Drumhead, Quintal Drumhead, Large Flat Brunswick, German Drumhead, Savoy and Green Curled Globe Savoy.

For pickling, Red Drumhead.

Cauliflower, extra early for summer use:—Very Dwarf, Earliest Erfurt, and Extra Early Paris.

Late varieties:—Half Early Paris, Le Normand's large late, Le Normand's short stem, Dwarf Erfurt and Veitch's Autumn Giant.

Celery.—Prince of Wales, Dwarf Large Ribbed, Carter's Incomparable Dwarf Crimson, and Boston Market.

I have tried many other varieties in each class with more or less satisfaction. Henderson's Half Dwarf celery has always been a rank grower, but strongly inclined to grow hollow stems. Among cabbages I have found Winnigstadt upon the whole to be the best. It forms quickly and so close that the worm seldom harms it.

Storing for Winter.—Cabbage for using or marketing in winter should be lifted early in November, or earlier if the weather is threatening frost and snow, as it is desirable that this work should be done in dry weather. Choose a dry piece of ground, dig a trench 18 to 24 inches deep and five or six feet wide with a rise in the centre. Place the cabbages close together on the ground roots upwards in this shape:—

(the dots represent the cabbages). Fill in between with dry soil about six inches deep, and on the approach of cold weather bank up all over with a uniform depth of sufficient soil to keep out frost. It is also an advantage to cover with old straw, corn-stalks or brush, so as to prevent alternate freezing and thawing. At the same time care must be taken not to have them too warm—better a little on the cool side. One layer is always enough in the trench. Some growers place them stem down so that resting on the stub of stem there is a passage of air under the heads. But this is done where a pit-house is built of posts and scantling on the same principle in other respects as already described.

Where plants have been set out late in the season and not fully headed when frost sets in, it is a good plan to dig a deep furrow and place the cabbages in this with as much soil as convenient adhering to the roots, cover over with straw and soil sufficient to keep out frost and in the spring the cabbage will be fully headed, white and crisp.

Cauliflowers.—In this section October ends the season for this delicious vegetable. It often happens with a late planting that a few have not perfected their heads. At the approach of frost these may be taken up and thickly planted in a moderately warm cellar, and by watering and airing good solid heads may be attained until mid winter.

Celery is not injured by light frosts, but heavy freezing is very injurious and it is well to begin the storing of this crop in good season. The first may be put away soon after the middle of October, and the whole crop should be stored away before the middle of November. Celery should always be stored when perfectly dry, and never while in a frozen state. A cool, airy cellar is the best place. The roots should be packed compactly in soil, deep enough to cover the blanched portion of the stalk. It should be inspected frequently during winter and all decayed leaves picked off. When there is not enough, or convenient cellar room for storing, select a spot well drained, dig

a pit the same as for potatoes, banking the earth up about three feet or over around the pit. Place posts in the ground along the centre of the pit, saw the tops off level and nail on a scantling. From this ridge place scantling at proper distances and cover with boards. Cover this with soil enough to keep frost out. The celery is placed in the bottom of this pit, which should be aired in fine weather.

ALEX. McD. ALLAN.

MR. BEADLE.—In our part of the world I find that our market gardeners are cultivating celery somewhat differently from what we used to do when we were boys. They plough the ground, mellow it, and make it rich; and then they just take the plough and make a furrow and set the plants out in it. They then cultivate it and take care of it while it grows up. Towards the fall of the year, when they want to hill it up, they run the plough through between the rows of celery, and then go along holding the plants in the left hand, and firm the earth up to them with the other hand. They then put the plough in again, and throw some more earth up, and so on. They bank the earth against the plants and keep it that way until the autumn, when they dig it up. Some plant it out again in trenches two or three feet wide, and set it down as though they were setting it out, with a couple of boards on it like a sort of roof. They also throw a little litter on it so that they can get at it in the winter. Others have a sort of above-ground cellar, and they pack it away in that with some soil around the roots as though they were setting it out to grow, and in mild weather these plants will grow away there in the cellar. I have known them to grow a foot longer in the course of the winter. In that way it is blanched; and they take it to the market as they want it in the winter.

MR. WILSON ARNOTT.—I have had some experience in growing cabbage. I think that of the late varieties Fottler's Drumhead and the large Flat Dutch are the best for the summer varieties. I generally raise the American Jersey Wakefield and the Winningstadt. The Wakefield comes about the 1st of July, and will bring about ten cents a head. The Winningstadt is about ten days later.

MR. EDWARDS.—Ten years ago I planted some cabbages between my currant bushes, and I never raised better cabbages. I first of all made my hill, puddled it well, then put my seed in, and afterwards put in about half a teacupful of hardwood ashes, and covered it up, and never did anything more, and I had the best cabbages I ever raised.

BLACK WALNUT.

MR. BEALL then read the following paper on the question, "In what parts of the Province can Black Walnut be profitably raised?":—

"The impression seems to prevail, generally, that the Black Walnut, which is indigenous in Kentucky, Indiana, Illinois, Ohio, the southern part of Michigan, and in only a very small portion of the extreme southern part of Ontario, will not thrive in the more northerly portions of the Province. Why this impression so generally prevails I do not know, as many of our best fruit-trees, flowering-shrubs, and also some of our forest trees, are natives of countries far south of the localities in which they are successfully grown. The nut of the Walnut, so much used as a dessert fruit, is the product of a tree of the *Juglandacea* family—*Juglans Regia*—and although a native of Persia, may now be found in large numbers in nearly every country of Europe. That very excellent map, compiled by Messrs. Bell and Drummond, showing the 'Northern limits of the principal Timber Trees in the Provinces of Ontario, Quebec, New Brunswick and Nova Scotia,' may possibly have done much to establish this impression: but it should be borne in mind that the authors of this map had nothing to do with acclimatization, or other kindred theories: they simply gave what they professed to give, viz: the northern limit of the principal timber-trees, and according to this map, the northern limit of the Black Walnut, when this Province was an unbroken forest, was a line nearly parallel with,

and a few miles north of the northern shore of Lake Ontario, having its eastern extremity at or near where Cobourg now stands, and extending westerly to a point where London now stands; thence in a north-westerly direction to Lake Huron. The reason why this line was its northern limit might be an interesting subject for investigation; but it is not my purpose at present to proceed on this branch of the subject. The fact is well established that the line indicated was its northern limit. Subsequent events, however, prove conclusively that its extension northwards, and also to the east, was not prevented by the severity of the seasons or unsuitability of the soil. Mr. G. M. Dawson says 'one specimen at least has been growing in the Province of Quebec for over forty years and is perfectly hardy.' The Hon. H. G. Joly, who has planted a large number of walnut trees in the Province of Quebec, says their growth is beyond his expectations, and gives dates and figures, showing the rapidity of their growth. One tree in 1880 was fifteen feet and a half high, having been grown from a nut planted in 1874. All his trees are quite healthy. There are many trees growing on my grounds in Lindsay, measuring from 20 to 28 inches in circumference four feet above the ground, which are not over 13 or 14 years old. In England it has proved itself well-suited to the climate and soil, and is now pretty generally cultivated throughout that country as well as in Scotland, both in the Highlands and Lowlands. It is also grown in some parts of Denmark and of Sweden, where, however,—as in some other northern localities—it produces no fruit. I know no reason why it should be less hardy than the sugar-maple and basswood, and as the northern limit of these trees is about 250 miles north of Lake Ontario, it seems quite safe to say that the Black Walnut can be successfully grown in any part of the Province of Ontario, wherever the soil is suitable.

Let it be conceded that the Black Walnut can be successfully grown in Ontario, the question very naturally arises: Can its growth and cultivation in Ontario be made a profitable enterprise? That is to say: Would it be a safe and wise investment to plant Black Walnut trees on a large scale simply as a business transaction? In this connection the following questions naturally present themselves for our consideration:—

1st. What amonnt of money will it be necessary to invest for the planting of a given area?

2nd. How much will be required for future cultivation and maintainance?

3rd. How many trees can be grown in a given area?

4th. What amount of time will be required for the trees to arrive at maturity?

5th. What will be the market value of the trees at maturity?

1st. The amount of cash necessary for the first investment will be the price only of the land intended to be used for that purpose, because the crops which should be grown on the land for the first fifteen years, together with the proceeds of the sale—or use of —the trees it would be necessary to weed out, would amply repay the small outlay for nuts, and also for the planting and subsequent care of the same for that length of time.

2nd. The money which could be realized from the sale of trees which it would be necessary to thin out, from time to time, after the first fifteen years, would much more than re-coup the owner for all cost for care, cultivation, interest on capital, and maintainance from that time forth.

3rd. I have no exact data at hand, showing the number of mature Black Walnut trees, which should occupy an acre of land. The tree, if grown isolated, will be short in the trunk, with a very wide, spreading head; but, if grown closely together, will be long in the trunk, and the head much more contracted. As this is a question of profit, which can only be obtained from *timber*, it would, therefore, be advisable to grow the trees as closely together as possible. It will require about 3,000 nuts, or between five and six bushels, to plant an acre, in rows, eight feet apart, and the nuts two feet apart in the row. Within three years, three-fourths of the trees should be removed, leaving the remaining one-fourth, eight feet apart each way. These could be allowed to stand until they became sufficiently large to pay the expense of removal, which would be in from 15 to 20 years from date of planting, by which time three-fourths of this number may be removed, and three-fourths of that number might be advantageously removed during the succeeding 20 years. There would then remain about 40 trees to the acre, distant

from each other about 32 feet, at which distance they could be allowed to remain for the next 100 years, if necessary.

4th. The length of time required for Black Walnut trees to arrive at maturity is not easily ascertained. The "Timber Trades' Journal" states that the Canadian Walnut was first introduced into England in the year 1656, and that many very old and magnificent trees may now be found in many parts of that country, whose ages are not known. One, however, which stands in the grounds at Fulham Castle, is known to be over 150 years old, and is yet a healthy tree. It is five feet in diameter and over 50 feet high. As the question, with which we are most immediately interested just now is one of profit, I prefer quoting the evidence of those who are well qualified to speak, rather than give my own opinion. Horace Greeley, when speaking of the value of Black Walnut timber says: "That growing indifferent timber when this best and most valued timber would grow as rapidly, is a stupid and costly blunder." Prof. L. H. de Friere, of Kentucky, says: "If farmers could only consider that a single tree of good Walnut timber is worth more than their best acre of land, they would take more pains to encourage the growth of a timber which is becoming so scarce in our country, and for which there is such good demand." Judge J. E. Whitney, of Iowa, says: "If I were to plant a section of timber for an investment for my children, I would have it all Black Walnut." Mr. James Dougall, of Windsor, speaking of the size which the Black Walnut may attain, in a given number of years, says: "In 1853, I planted a row of Black Walnut trees. . . . . I now find only four of them left, the largest of which measures four feet in circumference at the butt, three feet six inches at six feet high, and three feet at fifteen feet from the ground; and upwards of forty feet high. . . . . Had the nuts been planted where the trees were to stand, and had they not been injured by buildings so near them, they would probably have been much larger." I take the following from a late American paper: "Twenty-three years ago, Horace Everett planted 23 acres of waste land with Black Walnuts. The trees are now 20 inches through and have been sold at $27,000." The Hon. H. G. Joly, writing of the growth of the Black Walnut, in the Province of Quebec, says: "I do not hesitate to say that the Black Walnut, under ordinary circumstances, at the age of 75 years will have attained twenty-one inches in diameter." Thomas Meehan, in a late number of the "Gardeners' Monthly," says: "When travelling through Indiana, some weeks ago, the writer saw some Black Walnut logs that had been bought for $100.00 each. Even under the ordinary course of nature, such logs could be produced, in forty years, in an Indiana climate; but, with little careful culture, in infancy, such as one would give corn, we believe as good logs could be had in half the time." A Black Walnut tree stands but a few miles from this town (Trenton), within a few feet of the water, on the lake shore, in a very exposed position, which measured about 21 inches in diameter, two years ago. The owner of which states that he saw his father plant the nut, from which the tree grew, about seventy years ago. The growth of this tree agrees very nearly with the estimate of growth made by the Hon. H. G. Joly, for the Province of Quebec.

5th. I am almost afraid to give even the most moderate estimate of the value of an acre of well-grown Black Walnut trees, at maturity, or even when the trees shall have sufficiently matured to justify their removal, which might be from 60 to 100 years from date of planting; but, from the foregoing, it would seem a very moderate estimate, to place the value of each well-grown tree, at about that age, at $100.00, which would give the enormous sum of $400,000 as the value of the trees on a 100 acre lot.

This paper is already too long, although I have endeavoured to confine myself as closely as possible to the question proposed, that is, to view it as an ordinary business transaction; but, if the subject was continued to its legitimate conclusion, showing the climatic effects resulting from large areas of such plantations, and also the physical effects which might result to the inhabitants in the neighbourhood of such forests, it would overtask my ability to portray, and your patience to listen.

Mr. James Peck.—In our township we have just one black walnut tree, and it has been growing ever since I was a little boy. They have endeavoured repeatedly to raise

other young trees from the walnut, but the nut has always failed to germinate. The tree I refer to is healthy, and produces a fair crop of nuts; but that is the only tree I know of in the county.

Mr. President Dempsey.—There is a black walnut tree standing in the county of Prince Edward that would make two standard saw-logs. I got a bushel of nuts from it last fall, and I have only three of them that have germinated. I saw walnuts that were planted a year ago, and they failed to germinate till near the fall.

Mr. Leslie.—We have grown very few of the trees. We find great difficulty in germinating the nuts. They live all right after they are germinated.

Mr. Gott.—Both the black walnut and the white walnut, if they are covered with damp earth for the winter, immediately upon their being taken from the tree, and then planted in rows in the seed bed, will usually germinate, the whole of them; but should not the whole of them germinate, they will quietly lie there till the next spring and then will germinate. After they are germinated they will grow, and are easily cultivated. Transplant them the next spring, and they are easily got along with.

Mr. Graham.—A year ago there were some nuts sent me, and I have two trees growing from them now. I put them out a year ago this last spring. There were trees grown there before that that were drawn to Belleville as saw-logs. They are quite hardy.

Col. McGill.—There are walnuts growing in East Whitby and West Whitby—I think the largest in the group is eight or nine inches through. I find no difficulty in germinating the nuts, more than I do those of the common butternut. I generally put them into a box and fill it up with sawdust, and let it stand out in the ground all winter and freeze, and then move them in the spring, and set out those that have cracked. When I was a boy there was a good deal of walnut growing about the Whitby harbour. I have seen nothing approximating to profit in growing black walnut, the second crop. I am quite satisfied that if all the walnut trees that are growing in the two Whitbys to-day were cut and sawed, we should not get a hundred feet of black walnut altogether. The trees grow too slowly; our grand-children might profit a little by them, but nobody before them. Up about Goderich there used to be plenty of black walnut, but it has never been a natural tree to this section of Canada, and I question whether it is to be expected that where trees do not grow naturally you can set them out and make them a success for lumber.

Mr. President Dempsey.—There is no question that the man who planted this tree that I refer to is a younger man than Col. McGill, and he got two standard saw-logs out of it.

Mr. Beall.—With regard to germinating the black walnut, our friends here should not give up because they do not germinate the first year. I have a lot of trees that germinated only after they had been in the ground three winters; and then every nut came up. If the nuts are fresh and good when they are put into the ground, every nut will grow; if they do not come up in three years they will in four or five.

Mr. Duck.—My attention has frequently been called to the cultivation of the walnut, and I am perfectly satisfied that, if it is properly cultivated, and in the proper localities, it will grow easily and rapidly. I find that in a very few years it will attain considerable thickness. Even if the ground was kept for the express purpose of cultivating that tree it would be a paying crop. But if that plan were adopted, it would be better, perhaps, to make a selection of the seed that would be adapted to a certain locality. I know that if a walnut falls on the ground, and remains there all winter with a slight covering, it will grow in the spring without any attention at all if the fruit is perfect, and I have no doubt if there was a bed prepared for it, it would attain maturity and be more perfect.

Mr. Arnold.—I do not like the idea of the nuts lying three or four years in the ground. Last year we put a couple of bushels in the cellar, kept them moist, and now, I should say, almost every nut has grown, and the trees are a foot high already.

Mr. James Peck.—Did they freeze at all?

Mr. Arnold.—Some of them may have frozen.

Mr. Peck.—I understand they would not germinate without freezing.

Mr. President Dempsey.—Ours were frozen.

Mr. Arnold.—Somewhere in the neighbourhood of St. Catherines there are English walnuts which are fruiting now. If we could only succeed in crossing them, and raising our own English walnuts, we should be doing a good thing for the country.

REPORT ON FRUIT AND FRUIT PROSPECTS IN THE COUNTY OF LAMBTON FOR THE YEAR 1882.

Gentlemen.—After considerable reflection as to the subject that I could bring before you to be most interesting to you at present in this the midsummer meeting of our *Ontario Fruit Growers' Association*, I have concluded to present, to the best of my ability and as briefly as possible, a condensed report of the condition of our fruit in the county of Lambton for the present year. In a general way and in a medium season, this county is extensively known among the counties of Ontario for its abundance of rich and beautiful fruits that are the pride and the blessing of its cultured and fruit-loving people. We are, however, exceedingly sorry to have to report that the present season is likely to be one of intense and general scarceness in all our large and staple fruits, especially so in our apples and peaches, and to a felt extent in our plums and our pears. The strawberries in a young and tender state were also badly affected by frost, and to some extent, also, the gooseberries and currants. In our beautiful raspberries and blackberries and in our grapes, those later blooming varieties of fruits only, are we likely to have a full and profitable crop.

About March 28th, the spring appeared to be opening out early after the mildest open winter ever known amongst us. The weather suddenly became fine and the ground on high and well-drained soils became dry and workable, and we thought that "*now spring has surely come.*"

April 4th.—We began to work in the garden and nursery, taking up trees, &c., and the weather was nice and dry and every appearance of an early and pleasant spring for this entire country.

April 10th.—We discovered that the great mass of fruit buds on the peach trees were already killed and ready to fall off. This saddening effect was doubtless caused by the prolonged and unprecedented mildness of the winter and by a very sudden change of temperature which occurred January 22nd and 23rd, and swept over the entire country from west to east. The day before the change the weather was mild and raining, and in a few hours the temperature went down to 16° below zero, and in some places to 20° below zero, accompanied by a strong and piercing wind and was most disastrous to the peach crop of this entire country.

April 20th.—Much cold with rain and some snow keeps the spring backward and the weather is still catching and very uncertain, yet much spring work is being successfully done.

May 10th.—Still much cold and intense rains accompanied with some snow retard the movements of an early spring.

May 18th.—The weather is now very gradually warming up and becoming more and more spring-like. The leaf buds of some of our trees are already swelling for opening, and the singing of the birds is already heard in our midst.

May 20th.—Rapid changes are taking place in nature. The weather is fine and spring-like and garden and field operations are fast hurrying on to completion, and the country is wearing a renewed appearance.

May 31st.—During this week the most superbly gorgeous exhibitions have been opened up to our view that could be well imagined. The fruit trees were decked in rich and lively colour and the bloom was most abundant, cheering our hearts with promises of fruitfulness. The whole seemed to open out at once and the abundant bloom of the apple is vying with that of the pear; and that of the cherry with that of the plum; and the gooseberry and currant, with that of the strawberry, and all crowded in one picture completing a sight the most intensely gorgeous, and we ask, "*what will the fruit be?*"

June 3rd.—Heavy and constant rains occurred to-day, deluging the whole country

with floods of water, but still the warmth continues, and we hope no harm will result, but rather much good to the crops of grain and fruit of this country, filling our hearts with joy and gladness for abundant mercies bestowed.

June 5th to the 10th.—Strong winds; much cold and some frost has lately much prevailed, and may possibly tell disastrously on the young and tender fruit of this country

July 1st.—The annual birthday of our young Dominion, beautiful and fine but rather inclined to wet. It now appears that the injury done to our fruit crop by the cold and blighting winds of last month was widespread and very destructive, more so than we have had it occur here for many years. The leaves of the peach trees are almost totally shrivelled up and destroyed by the disease known as *curl*, which was no doubt caused by the same destructive influence. This is the worst attack I have ever seen, and in some cases will nearly, or quite, kill the trees. The young and tender strawberries just setting were in many cases badly frozen, and the crop will be much injured in consequence, but on the whole the crop now getting ready for picking is very fine and tolerably good. Some new varieties have come into prominence this season and promise to be popular and good. One of these is Duncan, a very fine fruit, and the plant is very prolific; and another is Warren, also a very fine promising fruit. We are very sorry to have to notice that the apple crop is much injured and almost totally ruined by the same destructive influences before noted. So severe were its dire effects upon the apple trees that the leaves are blighted, blackened and destroyed and in many cases falling prematurely from the trees, giving them an untimely autumn appearance. This is very surprising to our orchardists and many of them wonder what is the matter. What little fruit is setting on the trees will neither be beautiful nor good, as almost every specimen is badly injured on the upper side and will be scabbed and puckered, and of course unmarketable. Pears are almost as badly affected but not quite, and the specimens that are setting are not so badly injured. There seems to be no difference in varieties, as far as these effects are concerned. The influences on the cherry and the plum trees were not so disastrous as on the fruits before noticed. The first of those fine fruits is now ripening up very nicely; and were it not for the thieving propensities of our birds, we might pick a very fine crop, but as it is now the cherry cannot be depended upon for a crop of fruit, for the birds have them away before the fruit-grower can secure a specimen to test its luscious qualities. We find also that the Duke and Morrello classes of cherries would be the most desirable to plant on account of their ability to withstand disease. Of the latter we are glad to report the prospects good for a crop wherever the trees have been attended to and systematically and persistently jarred to keep off the dreaded *curculio*. Reine Claude de Bavay and Lombard are still trusty and best varieties to plant for market sorts. Scarcely a solitary peach will be had to grace our scanty board. Gooseberries and currants are also considerably affected, but still in these fruits the crop will be a medium one and some fine samples may be picked although not abundant. Raspberries and blackberries, on account of their later development, will come off clear, and the crop wherever well attended to will be large and good. The Black Cap varieties will be exceedingly abundant and fine. Mammoth Cluster and Gregg are the staples. Though the strawberry crop is still very popular and very profitable, yet in these fine fruits we have great confidence as they fill a much-needed place on the board. In our grapes we appear to have our only hope of reliance for a good fruit crop this coming autumn. In these fine popular fruits we have a great advantage in that we have the power of protecting them from the severity of our well-known treacherous winters. By the simple operation of laying down the canes late in the fall of the year and covering them slightly with earth to keep them down so that the cold and perishing winds can not pass over them, they are safe and will come out after the most dreaded season unharmed and ready to bear a full crop. This is a point of great value in the grape, and could we do it in case of our peaches and pears it would be of inestimable worth. The young grape crop at the present time is full of flattering promise, and the numerous and magnificent bunches are just now setting full and splendid, and are the hope and the joy of the attentive and intelligent fruit-grower. Rogers' Hybrids are particularly full and promising this season and so is Hartford Prolific and Champion, but Concord and Delaware, having borne such a massive crop last season, are not so full. Martha is a grape of great promise, and for a fine, hardy, popular white grape, fills the

bill, and apparently leaves nothing to be desired. As yet both the fruit and the leaf are clean and free of all disease, and destructive insects on the vines are not troublesome. We notice that the Thrip on the leaves is spreading rather more this season than usual, and one lady showed us her vines yesterday that were almost destroyed by them, but we think they could be easily managed. The value of the grape crop of this country is becoming more and more apparent every year as one of those crops that can be relied upon in every emergency.

Yours, &c.,

B. Gott.

Arkona Nurseries, July 12th, 1882.

REPORT OF COMMITTEE CHARGED WITH THE OVERSIGHT OF FRUIT AND FOREST PLANTING AT THE AGRICULTURAL COLLEGE, GUELPH.

To the Honourable the Commissioner of Agriculture:

Sir,—The Committee of the Fruit Growers' Association charged with the duty of directing the operations in Horticulture and Forestry at the Agricultural College, Guelph, beg to submit the following report:

The orchard begun in 1880 and extended in 1881 is in a healthy condition, and the trees are making as rapid growth on the whole as could be desired. It has been the aim of your committee to make this orchard not only an experimental one, wherein shall be tested every variety of fruit at all likely to succeed in this climate, but also to grow therein a sufficient quantity of the most valuable varieties to give an ample supply for the use of the College.

Apple.

There is now growing in the orchard six hundred and seventy apple trees, comprising ninety-two varieties. Those planted in largest quantity are Golden Russet, Roxbury Russet, R. I. Greening, Wagner, Northern Spy, Baldwin, Swayzie Pomme Grise, Snow Apple, Ribston Pippin, Talman Sweet, Mann Apple, Duchesse of Oldenburg, Gravenstein, St. Lawrence, Alexander, Norton's Melon, Chenango Strawberry, Twenty Ounce, Early Harvest, Red Astracan, Keswick Codlin, etc., and of those more particularly intended as experimental, only two trees of a kind have been planted.

Pear.

There are ninety-three pear trees now well established comprising thirty-six varieties. Fifty-three trees were planted temporarily in nursery row, comprising sixteen sorts. These will be placed in the orchard next spring.

Plum and Cherry.

The portion devoted to plums contains sixty-six trees, comprising twenty-three sorts, and that set apart for cherries contains fifty-one trees comprising eighteen sorts.

The Vineyard.

We are gratified in being able to say that the grape vines have done remarkably well, and while making a thrifty growth have matured their wood perfectly. There is now growing and well established five hundred and thirty-six vines, comprising fifty several different varieties. These will soon come into bearing, and become an interesting opportunity for study and comparison, while at the same time yielding a supply of agreeable fruit for the College tables.

Small Fruits.

These yielded some fruit during the past summer, and although your committee thought they had planted liberally of these, having put out over two thousand raspberry

plants and nearly four thousand strawberry, yet it was found that the requirements of the College were far from being met. In addition to the raspberry and strawberry plantation there are three hundred and twenty-three gooseberry and two hundred and twelve currant trees growing. These comprise twenty-one varieties of raspberry, thirteen of strawberry, three of gooseberry and four of currants.

Forestry.

The several clumps of Black Walnut, European Larch, Butternut, Sugar Maple, and of mixed trees, are doing fairly well, except that the group of Larch from some cause did not succeed, probably owing to the dry character of the soil in which they were planted. There is, however, a sufficient number of young Larches in the nursery plot to supply all the vacancies. It was found desirable to use the field in which the clump of Ash had been planted as an experimental grain plot. On this account they have been taken up and will be set out in another field next spring. The experiment of growing Black Walnut with and without cultivation is already demonstrating the fact that the growth is much more satisfactory where clean cultivation with occassional stirring of the soil is practiced. The nursery plantations of young trees will supply a considerable portion of the trees required for the proposed enlargement of existing clumps, and by keeping up a constant succession of nursery plantings the required trees for foresting purposes can he always at hand in the best possible condition for transplanting.

The Arboretum.

In attempting to extend the Arboretum the Committee found that it was absolutely necessary to re-arrange the front grounds, and to provide some definite and well arranged plan that harmonized with the grounds and buildings on which to base all future work. Hitherto no such plan had been prepared, hence it was impossible to proceed systematically with the extension of the Arboretum in a manner that would subserve the purposes of education and at the same time adorn the grounds and produce the proper landscape effect.

After some correspondence we were so fortunate as to secure the services of the most eminent landscape gardener in America, Mr. Charles H. Miller, of Fairmount Park, Philadelphia. He visited the College in April last, and examined the grounds thoroughly in company with yourself, the Committee and the architect. He has now prepared and placed in our hands a most admirable plan of all that part of the grounds; this plan has been approved by yourself, and when the planting and grading shall have been completed in accordance therewith, we believe that the College grounds around and in front of the buildings will be all that can be desired. Work has been already begun, and the grounds immediately in front of the main building laid out in conformity with the plan, and the requisite carriage ways to the recently erected residences of the Professor of Agriculture and of the Bursar provided. Already a great improvement in the appearance of the grounds is manifest, a pleasing foreshadowing of the results to be achieved when the whole work is once completed and time enough shall have elapsed to produce the growth necessary to give due effect to the whole. Ample space is now set apart for the planting of an extensive arboretum which your Committee intend shall be grouped in such a manner as to be convenient for study by the young men and serve as illustrations in teaching, and at the same time these groups will be so placed as to give the best landscape effects.

The new buildings, including those which have been erected this summer and those which are contemplated in the future, have been located upon the plan with a view to the general effect of the whole when they are completed. The buildings yet to be erected, and which are already very much needed, are the conservatory and propagating houses, with lecture-room attached; a chemical laboratory for teaching analysis of soils, manures, etc.; and the head-gardener's residence. It is to be sincerely hoped that the Legislature will grant at its coming session the funds that may be needed to erect these buildings, the lack of which greatly cripples the effectual working of the chemical and horticultural departments.

The Seed Beds.

With a view to giving a supply of young trees for future planting, and to afford at the same time instruction in the raising of forest trees from seed, a number of beds were prepared and sown with tree seeds. As was to be expected some of these seeds failed to germinate the first season, and after lying dormant in the ground for a whole year, came up in the second spring. From these beds a goodly number of some varieties of trees and shrubs will be obtained. Some of the kinds sown have apparently failed altogether, thus affording lessons to the students from failure as well as success.

Future Operations.

We have made arrangements with the Professor of Agriculture for a half acre block in the Experimental Field, which it is our intention to surround with a hedge formed from a variety of hedge plants, for the purpose of showing a sample of hedge formed from each. This will afford both students and visitors an opportunity of seeing the results produced by each plant when trimmed close and grown as a hedge, and test the adaptability of each for hedging purposes. The enclosed plot will be devoted to nursery beds for the growing of young trees taken from the seed beds or procured by purchase, until they have attained sufficient size to be removed to permanent situations. It is also intended to set out in the spring two or three additional clumps of forest trees, one of White Ash, one of American Elm, one of Mixed Evergreens, also to complete the group of European Larch, and extend that of Sugar Maple.

In the orchard all vacancies will be filled up, and the acre of ground recently purchased planted out so as to complete that portion; and such other varieties added as may be desirable for the purpose of testing their adaptation to our climate. Some additions will also be made to the plantation of gooseberries, currants, raspberries, and strawberries, in order to furnish a sufficient supply of these fruits for the use of the College, a large part of which will be taken from the existing plantations, particularly of raspberry and strawberry. Some new varieties of these fruits and of grapes will also be set out in the spring together with a few mulberries, so that the work of testing these may keep pace with the progress of horticulture elsewhere.

In conclusion, your Committee would say that such progress has been made in the department of fruit culture and forestry during the short time that has elapsed since you confided these to our direction as we trust will be satisfactory to you, both in the amount of work done and in the economical manner in which it has been accomplished. In a work of this kind great results cannot be acheived in a single season, yet, even now some fruit is being gathered, some improvements we think are to be seen, and these, we believe, will increase in progressive ratio as the years roll by until the results shall be seen in an abundant supply of fruits, of all kinds suited to the climate, sufficient to meet all the wants of the College, both for consumption and comparison; and groves of trees, and groups of specimens of every variety of tree and shrub shall give beauty to the landscape, and afford means of instruction in all that a well informed yeoman can wish to know of the character and uses of the forest products of his native land.

On behalf of the Committee,

D. W. Beadle, *Secretary.*

APPENDIX.

REPORT OF COMMITTEE APPOINTED TO ATTEND THE AMERICAN FORESTRY CONGRESS AT CINCINNATI, OHIO.

To the Honourable the Commissioner of Agriculture.

DEAR SIR,—The committee appointed by you to represent the Province of Ontario at the meeting of the American Forestry Congress held in Cincinnati, April 25th to 29th, 1882, beg to submit the following report:

We reached Cincinnati early on the morning of the 25th, where we received a cordial welcome from the Reception Committee, and met a large number of distinguished gentlemen, who had gathered from all parts of North America to discuss the various matters pertaining to the important subject of Forestry. We found the arrangements for the meeting very complete; the Music Hall, in which it was to be held, centrally located and provided with ample accommodations. The following valuable papers were in the hands of the committee, which were subsequently read, and furnished ample material for discussion, occupying all the time set apart for this purpose:

1. The Forestry of the Future.....F. B. Hough, Chief of Forestry.
2. The Southern Pine.....Dr. Charles Mohr, Mobile, Ala.
3. The Walnut Tree.....Wm. H. Ragan, Clayton, Ind.
4. Distribution of Canadian Trees.....A. T. Drummond, Montreal, Canada.
5. Flora of the Black Hills.....Robt. Douglas, Waukegan, Ill.
6. Woods of Canada.....Jas. Little, Montreal, Canada.
7. Arboreal Flora of Arkansas.....Prof. F. L. Harvey, Fayetteville, Ark.
8. Profitable Trees for Florida.....J. G. Knapp, Limona, Florida.
9. Forests of Michigan.....Prof. J. M. Spalding, Ann Arbor, Mich.
10. Forest Reserves at the Headwaters of the Ohio....M. C. Read, Hudson, O.
11. Roadside Planting for Utility.....Chas. Garfield, Grand Rapids, Mich.
12. Trees of Texas.....T. V. Munson, Denison, Texas.
13. Suggestions Regarding Government Assistance, Prof. W. Brown, Guelph, Ont.
14. Historical Sketch of the Development of the Forest Policy in Germany. Bernhard E. Fernow, Lehigh Furnace, Penn.
15. Preservation of Timber.....Prof. F. W. Clarke, Cincinnati, Ohio.
16. The Work of Western Nurserymen, Present and Prospective, S. M. Emery, Lake City, Minn.
17. Culture and Management of our Native Forests, H. W. S. Cleveland, Chicago, Ill.
18. Three-Motion Plan of Planting.....Robert Douglas, Waukegan, Ill.
19. The Wild Cherry Tree.....Hon. Horatio Seymour, Utica, N. Y.
20. Useful Trees of Michigan.....Prof. W. J. Beal, Lansing, Mich.
21. The Catalpas.....J. C. Teas, Carthage, Mo.
22. Cheap, Hardy Trees for the Prairies.....J. T. Allen, Omaha, Neb.
23. Woody Plants of Ohio.....D. L. and Jos. F. James, and Dr. Warder.
24. Forests and Health.....Dr. Daniel Milkin.
25. Climatology and Forestry.....Dr. George L. Andrew, Laporte, Ind.
26. Forestry and Rainfalls.....A. Sanders Piatt, Mackacheck, O.
27. Torrents and Torrential Floods.....D. D. Thompson, Cincinnati, O.
28. Evils of Woods Pasture.....Dr. J. A. Warder, North Bend, O.
29. Droughts, Famines, and Floods in China, David H. Baily, late Consul General of the U. S in China.

30. Forests and Rainfall in Ontario..... Prof. Wm. Brown, Guelph, Ont.
31. The Necessity for a School of Forestry in the United States,
Gen. C. C. Andrews, St. Paul, Minn.
32. What is a Forest Tree in the Eye of the Law?
Geo. C. Brackett, Lawrence, Kan.
33. Management and Culture of the Locust..... Waldo F. Brown, Oxford.
34. Measures of Locust Trees.....Dr. J. A. Warder, North Bend, O.
35. Culture of the Locust on Long Island..... Mr. Hicks, Long Island.
36. Educational Means..... B. O. M. DeBeck, Cincinnati, O.
37. A Suggestion from the Schools of Bavaria,
Prof. R. B. Warder, North Bend, O.
38. Forest Administration in Germany.....Robert Kuchnert, Cincinnati, O.
39. Lessons from Australia and Scotland..Prof. Wm. Brown, of Guelph, Ont.
40. Suggestions Respecting a Text Book on Forestry.....Prof. Wm. Brown.
41. Advantages Resulting from the Preservation of Forests....Baron Richard von Steuben, Royal Chief Forester of the German Empire.
42. Forestry in America..... Isaac Smucker, Newark, O.
43. Forests and Trees of Northern Georgia..H. C. Freeman, C. E., Elijay, Ga.
44. Woods of Indian Territory.....J. Foreman, Muscagee, Indian Ter.
45. Growth and Destruction of Forests..Dr. A. G. Humphreys, Galesburg, Ill.
46. Climatology and Forestry.....Prof. Ingersoll, Lafayette, Ind.
47. Trees of Southern California.....Wm. Heaver, Los Angeles, Cal.
48. Complaint of Diana—Poem.....Horace J. Smith, Nordoff, Cal.
49. Why Should we Plant Trees.....Dr. A. Eby, Sebringville, Ontario, Can.
50. The Poplars and Cottonwoods.....Sereno Watson, Cambridge, Mass.
51. Tree Planting.....Simeon Eby, Lancaster, Penn.
52. Planting on Streets and Highways.....
53. Wind Breaks on the Prairies.....C. E. Whiting, Whiting, Iowa.
54. Beneficial Effects of Wind-Breaks.....L. B. Wing, Newark, O.
55. State Commissioners and State Arboreta....W. R. Lazenby, Columbus, O.
56. Timber in Illinois.....G. W. Minier, Minier, Ill.
57. Trees Growing upon the Plains of Colorado—How Influenced by Climate, Altitude and Irrigation.....D. S. Grimes, Denver, Col.
58. Nature's Plan for Reproduction.....Leo Weltz, Wilmington, O.
59. Natur Verjungung.....Prof. Adolph Leue, Cincinnati, O.
60. Colorado Hardy Conifers in Cultivation....Thos. Douglas, Waukegan, Ill.
61. Colorado Conifers in Eastern Nebraska....J. Masters, Nebraska City, Neb.
62. Experiments in Planting on Cape Cod.....Jas. S. Fay, Boston, Mass.
63. Wald Verwusting, Wald Erhaultung, Kunstliche Bewalding,
K. Ludloff, Milwaukee, Wis.
64. Wind-Breaks on the Prairies.....Suel Foster, Muscatine, Iowa.
65. Pines of New England.....John Robinson, Salem, Mass.
66. Grouping in Forestry.....Dr. J. A. Warder, North Bend, O.
67. Sylva and Plantations of Nebraska.....Gov. Furnas, Brownville, Neb.
68. Nurse Plants in Forests.....Dr. J. A. Warder, North Bend, O.
69. Evergreens on the Prairies.....Samuel Edwards, Mendota, Ill.
70. Planting by Railroads.....Robert Douglas, Waukegan, Ill.
71. Iowa's Work in Tree Planting.....Prof. J. L. Budd, Ames, Iowa.
72. Cheap Trees as a Shelter for Better Kinds. Dr. J. A. Warder, North Bend, O.
73. Mixed Plantations.....Dr. J. A. Warder, North Bend, O.
74. Native Stock for Prairie Planting....George H. Wright, Sioux City, Iowa.
75. Antimiasmatic Influences.....F. L. Olmstead, Brookline, Mass.
76. Lessons to be Learned from the Forests of Western Asia,
Prof. H. S. Osborn, L.L.D., Oxford, O.
77. Injurious Insects.....C. V. Riley, Washington, D. C.
78. Forest Insects .....Wm. Saunders, London, Ont.
79. Arnold Arboretum.....John Robinson, Salem, Mass.

80. Experimental Forest Stations.....Prof. A. Leue, Cincinnati, O.
81. Trees of Worship Among the Ancient Greeks,
Prof. Edward North. Clinton, N. Y.
82. Romance of Forests.....Gen. Durbin Ward, Cincinnati, O.
83. Distribution of Conifers in the United States,
Dr. George Vasey, Washington, D. C.
84. The Cultivation of the White Mulberry,
Samuel R. Lowery, Huntsville, Ala.
85. Profits of Durable Trees.....Dr. A. Furnas, Danville, Ill.

The first session was devoted to the necessary organization and the appointment of committees for the nomination of permanent officers, and to prepare a constitution and by-laws. On re-assembling in the evening a large concourse of citizens were present, from fully two to three thousand in number. An address of welcome was delivered by Gen. Durbin Ward, who, in behalf of the "Queen City of the West," extended cordial greetings to all the representatives assembled. Much enthusiasm was manifested by the audience when the speaker referred to the delegates from the Canadian Provinces. Governor Foster, on behalf of the State of Ohio, next spoke, welcoming in the warmest manner the delegates from abroad.

Governor Foster's Address.

Gentlemen of the Forestry Congress: The citizens of Ohio appreciate the honour which this assemblage of thoughtful and scientific people, upon this, the occasion of the first meeting of a National Forestry Congress, confer upon their State, in selecting it for the place of beginning a great work, and it affords me pleasure gratefully to acknowledge the compliment you have thus paid us, and to extend to you the welcome and hospitality of our citizens.

The subjects that are to be discussed by this Congress have worthily attracted great attention and thoughtful consideration in the countries of Europe, by the General Governments and many of the State Governments; but so far as our own country is concerned it has not attracted a tithe of the attention which the great importance of this subject demands.

The general public is just being awakened to its importance, and will watch your proceedings with more attention than has been given to any other public assembly recently held, or likely to be held in the near future.

The public need is to be enlightened upon the annual rate of destruction of our forests for commercial uses and agricultural and mechanical development, the annual losses by fire, and at the present rate of destruction how many years will elapse before the destruction reaches such a point as most seriously to affect our water supply, agricultural products, and health of our people; upon the best methods of economy in the use of timber; upon prevention of unnecessary waste; upon the best manner of securing safety from destruction by fire; upon the effect of destruction of the forests upon the climate, water supply, rain-fall, productiveness of soil and health of the people; upon the ratio of forests to cultivated land necessary to the best results; upon the most effective means for supplying the losses occasioned through fire and deforestry by farmers and lumbermen, and, finally, upon the legislation that Congress and the General Assemblies of the several States and Territories should enact.

Your scientific and practical attainments are a full guarantee that the subject you have in hand will be most thoroughly and earnestly considered.

You will pardon me, I know, for suggesting one consideration that ought not to be overlooked, if practical results are to be obtained.

The people of this country are eminently practical, and the strongest inducement for action upon the suggestions that will go forth from you that can be presented them, is an affirmative answer to the question, "Will it pay to follow the advice of the Forestry Congress?" And I use the words "Will it pay" in a broader sense than mere pecuniary profit.

If you can furnish an affirmative answer to this query you will have made a great step forward in the work that has called you together.

Notwithstanding the magnitude of the subject to which you are preparing to address yourselves, I feel confident that through your deliberations measures will be initiated which will be of inestimable value to the health, wealth and prosperity of all the people of this country, and will mark an epoch in its economic history that will be remembered with pleasure in all the future, and I doubt not that the coming Ohio man will proudly and gratefully call attention to the fact that the American Forestry Congress distinguished his State by holding its first session in its largest city, and through its deliberations therein, were evolved and moulded into practical form great scientific truths upon the subject of Forestry, that resulted in great good to all of the people of the Republic.

The Committee on Constitution and By-laws presented their report, which was adopted. The Hon. George B. Loring, United States Commissioner of Agriculture, was unanimously elected President, and on rising to deliver his address, was enthusiastically cheered.

President Loring's Address.

Gentlemen,—I have accepted your invitation to be present on this occasion and to preside over your deliberations, not because I feel competent to instruct in the art of forestry, but in order that I might assure you of the sympathy of the Agricultural Department of the Government, and of my own high estimate of the value of your work. The question of forestry is one of the most intricate and difficult of all the agricultural problems which come before us.

That our forests are wasted by reckless extravagance and by uncontrollable conflagrations; that they are diminishing before the immense demands upon their products, we all know. Their importance as a climatic influence is conceded. The profit of tree-growing on wisely selected lands is acknowledged. But the methods by which our forests can be restored and preserved still puzzle the statesman and the cultivator alike. The nature of property in timber lands as adjusted for the State and the individual, in all those countries where the forests have attracted the special attention of the Government, particularly in the Old World, has so much of exclusiveness and reservation for the gratification of personal desires, that we can derive but little benefit from its study. The rights and powers and duties of State and Federal legislation, as regards our forests, require the most careful and ingenious consideration. We learn from the statistical returns the vast value of forest products to our commerce, to our domestic manufactures, to our internal trade. And by constant investigation we are ascertaining the best systems of tree-planting, and of cultivating specific wood crops in favorable localities. You will pardon me, therefore, while I leave all these difficult, practical problems for the consideration of those who have brought here the results of long study and experience, and turn my attention to the value and

Importance of Tree Culture

as one of those arts by which man beautifies his abode, and manifests that taste which especially distinguishes him in the scale of animate being, and which he labors to gratify as soon as he has laid the hard and substantial foundations of State and Society. Men build first, and then plant. The primary work of erecting an empire, in which all the sturdy virtues are called into operation, and where courage fixes the national power, and wisdom establishes the national education, is not a field for the exercise of man's love of beauty. With the wars and the felling of the forests, and the log cabin and primitive school-house of a newly-settled country and a newly-founded empire, taste has but little to do. But when safety and property are made secure, and the highways are well worn, and the skill and strength of the cultivator have stripped the landscape of its natural beauty, and the foot of man has trampled out the graceful lines in which Nature always works, then there uprises man's demand for the beautiful, and he endeavors to restore by art what he was obliged to destroy for his subsistence. For whatever may be his outward circumstance, however hardening and depressing may be the incidents of his life, man has an instinctive love of beauty, which insists on being gratified. He knows that this is his distinguishing characteristic which separates him from the beasts that perish—an element of his mind and heart which leads him "from nature up to nature's God."

To him the sunrise means glory as well as daylight. The lone and lofty mountains elevate him to the contemplation of the Almighty power, even while they are "a shelter to the wild goats;" and the dewy pastures where the cattle graze and recline in the long shadows, lull him to the sweets of evening repose; the sparkling stream, "where the wild asses quench their thirst," will soothe and sing him to happiness and rest. The majestic and commanding tree, whose widespread branches shelter the panting animals from the blaze of the noon-tide sun, is a picture of power and strength and varying loveliness, which is to him a source of never-ending delight. When his eye surveys the swelling landscape, the emotions which belong to him as a child of the Creator of all, inspire and elevate him above the earth on which he treads, and distinguish from that other order of animal existence, to which all scenery is alike, whose sensibilities no ugliness of nature or art offends, which no starry heavens delight, and no homely surroundings disturb; whose vision is blind both to the graces and deformities of even its own kind, which nibbles the daisy and the June grass with equal satisfaction, and whose soul "cannot rejoice with those who rejoice, nor weep with those who weep." It is man alone who knows that "a thing of beauty is a joy forever."

Taste in Tree Planting.

It is in accordance with this sentiment that man has applied his skill and taste to the creation of all the charming scenery of groves and bowers and gardens, to the enhancement of natural beauties themselves. Great gardens of antiquity, the monstrous towering pleasure grounds of Rome and Babylon, set an example which advancing civilization has not failed to follow. The cultivation of parks and gardens constitutes one of the most interesting and important duties of modern art—a duty of the faithful performance of which England has set an admirable example. Leaving, in the early part of the eighteenth century, the formal and heavy style then in vogue, through the influence of some of her illustrious poets—Addison at Bilton, and Pope at Twickenham—the English people revolutionized that whole system, and established that classical style of planting which has since been so much admired and imitated throughout the most refined parts of Europe.

This science of landscape gardening, which advanced so slowly in the Old World, and the proper system of constructing a city with light and water, and parks and shaded streets, which was so shamefully neglected until a comparatively recent period there, have until within a few years been entirely overlooked in our own country.

When more than seventy years ago, the city of Cincinnati was founded, and the spot was chosen on which has been erected such a splendid array of public buildings, private dwellings, music halls, art galleries, churches and libraries, the application of art to the arrangement of gardens, parks, streets and highways, was hardly thought of. It was enough to clear the land and till it without converting it into a pleasing picture. It was all the early settlers in our country could do to blaze a path through the forest without considering how best to crown and drain a highway, and it was not until after the Revolutionary war that the planting of trees and shrubs was made a necessary part of the laying out of gardens and grounds. I remember well the only garden in the State of Massachusetts, laid out early in this century by an English gardener, and kept in good order to within a dozen years, an object of delight to all who were allowed to enter its sacred inclosure and perambulate its well-visited walks. Such a scene as this was rare. Public-spirited citizens planted avenues of trees in highways, and were considered benefactors. Here and there a "door-yard" was ornamented with clumps of lilacs and syringas, but nowhere, that I am aware of, were there associations of enterprising and tasteful citizens organized for the purpose of adorning their towns and of providing for the health and comfort of themselves and of the community of which they formed a part. It remained for our own generation to unite for so important and laudable a purpose; and I congratulate this beautiful city that its natural comeliness has been enhanced and its suburbs made delightful by the combined efforts of those who believe that a love of beauty is a human attribute, and that we are under a sacred obligation to preserve that health which is given us for a high and useful purpose. The practical service of an asso-

ciation like this, as I have said, it is not necessary for me to discuss here, in the presence of those who know by experience how trees and shrubs should be grouped ; who have learned that an evergreen should be transplanted in August, and that a little lime and muck applied to the roots when it is planted will give it a wonderful stimulus ; who understand that a plantation of trees should be made to suit the building it is to surround and the landscape it is to occupy ; that trees should not be planted too near a building, or too near each other ; that the plants nearest the house should be low in stature and of a beautiful sort ; that the shades of green should be properly blended, and the foliage selected accordingly ; that trees should be protected by each other against those winds which are obnoxious to them ; that the Norway will not bear the rough gales from the sea, and that the Scotch pine rejoices in them ; that trees and plants should not be "marshalled in regular order and at equal distances," like beaux and belles standing up for a quadrille or country dance ; "that it is easier," as Downing says, "to make a tasteful park by planting new trees than by thinning out an old forest, and that nature herself is full of hints and suggestions," an observance of which constitutes the highest art of which man is capable in all that work of which earth, sea and sky form a part. With all this you have long been familiar, as the practicable part of a most agreeable labor ; but for the trees themselves, these living monuments of nature's bounty, or of man's skill ; those landmarks which we love to contemplate, those sentinels and armies along the landscape ; those silent friends who somehow connect themselves with so many of the dearest scenes and events of our lives, and watch over the graves of the departed day and night, and through all the changing seasons—for the trees themselves let us say a word.

Beautiful Trees.

Now I know not how it is, but next to the face of an old friend returned from a long absence, the sight of a landscape or a tree, once familiar and connected with the early events of our lives, long lost and now bursting upon our vision, fills us with the tenderest emotion. Who that has suddenly come upon a flower by the wayside in a foreign land, which grew beside some well known path in the country of his home, has not been filled with sweet recollections and transported to that spot which will forever outshine the glory of all others ?

How often have we turned our eyes unexpectedly upon a solitary tree keeping watch and ward over a hillside pasture, and at once, as if the heavens had been opened, there came a vision as dear to us as the memory of that sacred band of the loved and lost ! How often has a footpath, winding through the woods, opened suddenly upon us, and in a moment a long past, and perhaps long-forgotten hour of joy, shone round about us ? The trees are indeed our companions, clothed by us with the most delightful associations, appealing and responding at once to our sense of beauty, and preserving, as it were, with tender care our choicest memories. Their story is all told and well told by the young Indian who, in the midst of the splendor of Paris, regretting the simple beauty of his native island, sprang forward at the unexpected sight of a banana tree in the Jardin des Plantes, embraced it while his eyes were bathed in tears, and exclaiming with a voice of joy, "Ah, tree of my country," seemed by a delightful illusion of sensibility to imagine himself for a moment transported to the land which gave him birth.

Trees of History.

And then what a living and vital interest gathers about those trees which either by accident or by design have become monumental and representative. To know them well is to be intimate with the great deeds and the great men of history. Into what classic associations and deeds of daring, and raging and majestic conflicts by land and by sea, and profound mysteries and rites are we borne by the long and interesting story of the

Oak,

the tree which Pliny says held "*Honos apud Romanos perpetuus*"—the highest honor and repute with the Romans. We recall the solemn ceremonies of the Druids among the oak groves which stood strong and solemn on English soil, during the morning

twilight of English civilization. The scarred and sturdy tree near "White Lady's," in which the defeated monarch hid himself after his almost miraculous escape at the battle of Worcester—how like a guardian angel it stands in the history of royalty in England.

The contemporary of this tree, the wide-spreading oak of Hartford, spared from the primeval forests of America, as imposing and perhaps as ancient as the Pyramids, decayed and broken, concealing in its stout heart the Charter of Colonial Privileges—what a cherished and commanding figure it is in the record of freedom on this Continent! What a tale of valor and proud endeavor, and the heroism which triumphs where "the battle rages long and loud," could that pasture oak tell, which was borne from the fair hillside of Andover, Massachusetts, to become the sternpost of the immortal frigate, Constitution?

The Elm.

Call to mind now the story of the elm tree, and what a mingling of fable and fiction and interesting fact gathers around it. When Orpheus returned to earth from his melodious mission for Eurydice to the dominions of Pluto, and sat him down upon the verdant hill, it was the elm which first responded to his plaintive airs, and offered him his refreshing shade. It gave its name to the imperial city of Ulm, in Germany, and as Elmwood it designates the home of one of the most brilliant of modern American poets.

The elm planted by Henry IV., of France, in the Luxembourg gardens of Paris: the elm which Queen Elizabeth planted with her own hands at Chelsea, while waiting for the crown; the elms planted by Sir Francis Bacon in Gray's Inn walks, will not be forgotten so long as the memory of these remarkable persons shall endure. And when we turn to the pages of Columella to learn the food most used for cattle in his day; and to the plays of Plautus to read with what twigs the Roman rogues were beaten; and to Evelyn to find out what timber made the best pipes, pumps, poles, ship-planks, beneath the water line; and to Galen and Pliny for a sovereign remedy for all the ills that flesh is heir to—we find that the elm reigns supreme, and is nutritive, corrective, medicinal, and imperishable, alike. To my mind there gathers around this tree, also, historic associations at once romantic and tender. One hundred and fifty years ago, Captain John Lovewell, of Dunstable, Mass., with a little band of forty-six followers, started in early spring to drive Pangus and his tribe of Piquackets from the fertile lands which they occupied near Fryeburg, Maine, and from which they made their murderous assaults on the white settlements. The march was through pathless woods, and the expedition was one which required all the strength and courage which man can possibly command. Chaplain Frye, who accompanied the little army, was a young man, born in Andover, a graduate of Harvard, an exemplary youth, an accomplished scholar, and a devoted servant of Christ, the profession which he had chosen. On that beautiful May morning, when Captain Lovewell's men were ambushed by the Indian warriors of Pangus, on the shore of the Piquacket Pond, Chaplain Frye was one of the first to fall mortally wounded. When he left his home to join the expedition he planted an elm tree, in that early spring time, on a commanding eminence in his native town, in order, as he said, that he might be remembered should he fall in battle; and there it stands at this day, a lofty and noble monument to the devoted young Chaplain, putting on its green robe each year on the anniversary of his death, and taking on its sad, yellow hue in the autumn as if in mourning for him whose name it bears. And to every son and daughter of America, what a representative tree this is! Would you learn its significance? Go with me, then, to that ancient farmhouse, standing as it has stood for more than a century on that sunny slope which our fathers loved so well. That ancient dwelling, with its broad and open front, receiving on its ample brow the sweet south wind, and with its long sloping, defiant roof in the rear, closed firm against the invading north, the type of our ancestral architecture. It stands there still, as it has stood for generations, gathered around and supported by the massive chimney, which has so long sustained and warmed its hospitable heart. It is a bright June morning, and the sun is pouring in its flood of light upon the narrow entry, with its homespun carpet, and its steep and winding stairway, leading to the cheerful chambers, fragrant with sweet herbs and the sweeter air of heaven. From the sunken door-stone, trod into earth by the footsteps of many a hardy and honest genera-

tion, to the humble roadside, the green and grassy slope extends, telling its story of the joy and happiness which have gathered on its sod, and the sad tale also of sorrow and woe, how young and old have been borne out of that threshold, the child and the mother, the youth and the gray-haired father, amidst tears and sobs, down to the silence of the grave. And over all that scene the drooping elm looks down from its towering height, a witness of the domestic drama which has been acted there for years, and now the recognized type of those virtues which adorned our ancestors, those protests and assertions which made them great, the courage and defiance which made us free. Do you think there is in all the world another tree like the American elm—the accepted ornament of our ancient rural homes, the grand and solitary sentinel, seen from afar, and telling this story of American life with which you are all so familiar, and of which you are all so proud? In this centennial period of our history, too, how this tree is woven into the heroic events of our annals! There are many incidents of that great time when our fathers rose up to assert their independence; the amazing stand at Lexington and Concord; the calm and steady courage at Bunker Hill; the solemn assembling of the Continental Congress; the generous devotion of the colonies to each other; the impressive patience of our great revolutionary existence; but not one stands out in greater proportions than that scene at Cambridge, when Washington, in the calm majesty of his manly strength, assumed the command of a disorganized body of militia, named it the Continental army, and waged war against the most powerful Empire and the best disciplined troops in the world, and founded an independent nationality of freemen. The canopy beneath which this sublime event occurred has become immortal as the Washington Elm.

Who that is familiar with sacred history can fail to be reminded of the most stirring scenes in the career of God's chosen people, as he contemplates the

Cedar,

the tree which crowned Lebanon, and was associated with the highest and most sacred art and architecture of the Jews. Never was tree dedicated to more illustrious achitecture than when Solomon sent his four score thousand hewers into Lebanon and covered his Temple "with beams and boards of cedar." And the great king immortalized the tree when he selected as the type of one of his noblest conceptions: "His countenance is as Lebanon, excellent as one of the cedars."

The temple of Diana, at Ephesus, which was 220 years in building, was constructed in its frame and boarding entirely of cedar. It is of this tree that Madame de Genlis says: "The rose will be in all countries the queen of flowers; but among trees the honour of being king belongs only to the ancient and majestic cedar." And so high a place has this tree secured in history, that "the few cedars still remaining on Mount Libanus are preserved with a religious strictness; and on the day of the transfiguration the Patriarch repairs in procession to them, and celebrates a festival called the feast of cedars."

Trees for Inspiration.

The intimate relations which trees bear to remarkable events and illustrious persons are almost innumerable, as you may infer from the few and striking illustrations to which I have called your attention. But these insensible though living companions of man do not stop here. They afford shelter and encouragement to his loftiest aspirations, and offer him protection and sympathy in those hours when his mind is filled with fervour and inspiration. Evelyn says: "Innumerable are the testimonies I might produce concerning the inspiring and sacred influence of groves from the ancient poets and hisf torians. Here the noblest raptures have been conceived; and in the walks and shades o. trees poets have composed verses which have animated men to glorious and heroic actions. Here orators have made their panegyrics, historians their grave relations, and here pro found philosophers have loved to pass their lives in repose and contemplation." Would you find instances of this in your own day? Attend Hawthorne, then, in his wooded walk at Concord, and learn the height which man's contemplation may reach amidst the whispering silence of the groves; join Thoreau in his forest seclusion, and know the inspiration which belongs to those solemn arches and the leafy chapels which Nature prepares for her worshippers.

Trees for Profit.

And now, to him who, in a spirit of thrift and economy worthy of that people to whom as an American he belongs, would ask what is all this worth? let me say that the judicious selection and planting of trees may be made one of the most profitable branches of agriculture. Not for the beauty of the town alone, but for a thrifty use of remote and deserted acres also may the culture of trees be made a part of the business of life. A venerable clergyman in Massachusetts, the father of one of the most distinguished bankers in Boston, left at his death a large territory of woodland in the town which was blessed with his ministry for more than fifty years, and the profits on this land, which he had purchased at a very low rate at the beginning of his professional service, and which had been devoted to the growth of wood, principally pine, were greater than those realized on lands purchased and sold at the same periods in the most prosperous part of Boston. "We have heard of a gentleman," says the author of Practical Economy, "whose lands were more extensive than fertile, whose practice was to plant fifteen hundred trees, on the birth of every daughter, upon his waste grounds, which were on an average worth one pound each on her becoming of age, thus enabling him to give her a fortune of £15,000 without any extraordinary economy on his part, the regular thinning of the trees at proper seasons, with barking, etc., paying off the current expenses, besides yielding him a small rent for the land." The profits derived from the growing of the pine, the locust, and birch, all capable of flourishing greatly in light and worthless lands, have been in many instances very remarkable. Perhaps I would not recommend the cultivation of wood and timber as a universal branch of agriculture in these days when the secret of the business lies in quick returns and devotion to local markets; but I can find in the experience of those who have tried it an encouragement to those who, by the possession of large tracts of waste lands, may be compelled to follow their example in the business of tree-planting; and I read with profound interest the statement addressed to Governor Foster by an enterprising citizen of this State, with regard to his success in tree planting, and the groves of walnuts, maples and chestnuts which he is cultivating with pleasure and profit.

But more than all this, to the poetic and practical alike I would present the advantage of

Ornamental Gardening,

both in our towns and around our rural homes, and its kindly effect upon the character of those who are subject to its influences. It is an old story, I know—this of the refinement and invigoration which attend pursuits upon the soil—but it is so true and so charming and, I am sorry to say, so little heeded, that it may, if properly told, be repeated a thousand times, and heard with pleasure and profit. The devotion of mankind in all ages to the land is a feature of social and civil history which cannot be lost sight of by him who would trace the steps which man has taken in his progress and development. "To dress the garden and to keep it," was the first duty imposed on man when he entered into his career on earth, and "to dress the garden and to keep it" has been the desire of every man who, after long wanderings, has learned the point from whence all his impulses sprang. The poor man seeks the soil; the rich and the powerful believe in its refreshing influences and its repose. The industrious and frugal mechanics and labourers of our country all toil for a home and a spot which they can cultivate. The merchant of our day, like his ancestor in the early periods of our commercial history, when every man bought a farm, believe now in the delights of rural and suburban life. The law and the custom of our fathers was a land-holding clergy, established for life in their ministrations. From the farms and plantations of the colonies sprang brave and hardy and wise men, who gave us our freedom and our nationality.

I trust, therefore, that to this and to all other associations dedicated to the work of preserving and restoring our vast forest wealth, and of beautifying the earth upon which we tread, the people of this continent will extend a grateful heart and a helping hand.

In conclusion, let me urge upon this Association the most careful consideration of the topics before it—the use of forests; the conservation of forests; the influences, in-

jurious and beneficial of forests; the educational means by which we may become acquainted with Forestry work. To what extent can the land-owner enter profitably upon the business of tree-planting and forest culture? What legislation can the States best adopt for the increase and preservation of their forests? How shall the General Government provide for the planting of forests on its public lands? What is the precise extent of forest waste? What is the comparative value of various timber trees? How shall we secure wind-breaks on the prairies? By what chemical processes can we preserve our timber used in building and fencing? What forest trees are best adapted to various localities?—these are questions which should be answered as definitely as possible. They are questions which the American people are anxious to have answered, and before which all discussion of foreign legislation, all consideration of the value of wood products, all statistics of trade, all study of land tenure, sink into insignificance. I trust the deliberations of this convention will point the way by which these problems can be solved, and by which our vast forest wealth can be economically preserved and profitably used.

At the close of this eloquent address, which was listened to with marked attention throughout, the orchestra provided for the occasion furnished some excellent music, closing with "God Save the Queen."

April 26th.

The Congress commenced at 10 a. m.

The following communication from Richard Von Steuben, Royal Chief Forester of the German Empire, was read.

FALKENBURGH, near Dommitzsch, District of Torgau,
March 11, 1882.

MOST HONORED SIR,—I thank you most sincerely for your cordial invitation to the opening exercises of the National Forestry Association. It is, however, to my greatest regret, impossible for me to accept the same. Irrespective of all personal considerations, I am bound here by the onerous duties of my position as an officer of the King; for a trip so far and time consuming, I would have to crave leave of absence of the Minister, which I cannot do so soon after the long leave of absence given me last fall, especially not during the planting season, when the superintending officer can least be spared.

I regret most exceedingly that I cannot attend the opening exercises, since it is certain that your Association will be productive of much good to the whole country. During my stay in the United States last fall I had occasion to discuss the question of the rapidly growing necessity of introducing a regulated Forest Government in order to prevent future calamities which must undoubtedly result from a reckless destruction of the forests. Even the Honorable Secretary of the Interior, at Washington, honoured me with a consultation on the subject.

There can be no doubt that every country requires a certain quantity of well stocked woods, not only to supply the demands for building material and fuel, but more especially to secure suitable meteorological conditions, to preserve the fertility of the soil, and out of sanitary considerations. The ratio of the minimum quantity and judicious local distribution of the indispensable forest to the aggregate area cannot be expressed by a universal rule, but the same can only be approximated by scientific investigation. Above all things, it is essential to prevent forest destruction where such would injuriously affect the fertility of the soil. It is important, then, to preserve and to cultivate judiciously those forests which stand at the head-waters and on the banks of the larger streams, because through their indiscriminate destruction fluctuations in the stage of water, sandbars, and inundations of arable lands are occasioned. It appears also necessary to preserve and properly to cultivate woods in quicksands, or the summits and ridges, as well as on the steep sides of mountains, along the sea coasts, and other exposed localities.

In Germany, and especially in my more narrow bounded fatherland, Prussia, it is regarded as of the greatest importance, not only to preserve the forests already there, but to extend them as much as possible.

In the National Appropriation Bill large sums are set apart for the purchase of such lands as are unfit for cultivation, and for utilizing the same by planting trees.

In the Germam Empire 25.7 per centum of the aggregate area is occupied by forests —that is, 13,873,065 hectares out of 53,974,041 hectares. In Prussia the percentage of wooded land is 23.4 per centum of the entire area—that is, 8,124,520 hectares out of 34,750,903 hectares. Of the Prussian forests about one-third belong to the State, to wit, 2,648,892 hectares, which produce a gross income of about fifty-five million marks, or a net income of about twenty-five million marks. The Government foresters come within the province of the Minister of Agriculture and Forests. At the head of this department is the Chief Master of the Forests; in each governmental district is the Forest Master, who serves as a member of the Governmental Commission, and the entire forest area is divided into 680 principal forest districts. Each forest district is separately valued, and for each separate part regulations are devised, which are strictly followed, thus attaining the chief object, of so regulating the annual amount of wood-cutting that a continuous gain in material and money is secured, and even increased. The forest government is devised with the minutest detail, and may well lay claim to being termed exemplary; it strives not only to utlilize the forest as a source of income, but rather are the Government forests used to continually satisfy the requirements of the country.

In order to obtain a situation as a Government officer of the forests, a course of study of several years at the Forest Academy is required. After which follows about ten years' preparatory service before a definite engagement can be made, the qualifications for which must be proved by several examinations even for the minor positions in the Forestry Department; several years' apprenticeship and considerable preparatory service connected with the military service in the Hunters' Corps, and two examinations are required. Besides the real Government forests there are the Forests of the Faithful Royal Veterans, Community Forests, Corporation Forests, &c.

The Forests of the Faithful Royal Veterans are governed entirely according to the principles of the State Government. The State exercises a supervisory power over the other forests named, so that even as to these a regulated system of government prevails. It is otherwise with forests owned by private individuals, for they are not restrained in the use of their forests, and may, according to their own judgment, clear the same and till the soil, in short, do what they like, and yet there may be certain restrictions placed on the free use of the same as soon as danger to the common welfare is feared; these restrictions are prescribed by the law of July 5, 1875, relative to forest protection.

This law is applicable in cases:

1. Where by reason of the sandy nature of the soil, adjoining lands, or public grounds, natural or artificial courses, are in danger of being covered with sand.

2. Where through the washing away of the soil or through the formation of cascades in open places on the ridges of hill and on hillsides, the arable lands, streets or buildings living below are in danger of being covered with earth or stone or of being flooded; or the lands or public grounds or buildings lying above are in danger of sliding.

3. Where through the destruction of the forests along the banks of canals or natural streams riparian lands are in danger of caving, or buildings hitherto protected by the woods are in danger of iceflows.

4. Where through the destruction of forests rivers are in danger of a diminution of the stage of the water.

5. Where through the destruction of forests in open places and near the lakes, neighbouring fields are seriously exposed to the detrimental influences of winds.

In the cases above mentioned, which have been copied *verbatim* from the statute book, the manner of use as well as the culture of forests may be legally ordered, in order to prevent those dangers where the dangers to be averted are considerably in excess of the damages which would result to the owner by reason of the restrictions.

Excepting the restrictions prescribed by this law, the owner may dispose of his woods as he pleases.

Finally, permit me to remark that the larceny of wood and other products of the forests is punishable according to a law of April 15, 1878.

It is evident that these Prussian regulations are not all applicable to the United

States, as circumstances are so entirely different there. Unfortunately I am not sufficiently familiar with them to venture an opinion as to judicious measures to be taken for the protection of the forests, and it would have given me great pleasure to have informed myself on the grounds and to have taken part in the deliberations.

I trust you will grant me the favor to inform me of the result of your sessions, and consider me always ready to give all desired information concerning, as well as our forest arrangements, as our usual mode of planting and cultivating trees; indeed, to give information of all kinds and at all times.

Permit me now, my dear sir, to thank you most heartily for your friendly invitation and to express my sincere regrets at my inability to accept the same. Give my kindest regards to the gentlemen of the committee. I wrote to Mr. Adolph Strauch a few days before the receipt of your letter. I thank you for your friendly wishes, and return mine most heartily.

I am, with greatest respect,

RICHARD VON STEUBEN,
Royal Chief Forester.

The first paper read was from the venerable James Little of Montreal, Canada, which is as follows:—

While my efforts have been mainly directed toward the protection from destruction of the forests of white pine, it has been painful to me to witness that our other commercial woods, such as walnut and oak and ash, are nearly all gone, and our pine, spruce, birch and tamarac are following so fast that we will soon have nothing left of commercial value.

I know that the idea prevails on the American side of the line that the area of timber land in Canada is so great that the supplies are practically exhaustless; but this idea, I regret to say, is not borne out by the facts. The best authorities state, and I believe it true, that ten thousand millions of feet, board measure, will comprise all the merchantable pine of the Provinces of Ontario, Quebec, New Brnnswick and Nova Scotia; and, as we are drawing from these points over one thousand millions annually, less than ten years will, unless the production be curtailed, use up our whole stock.

As to the pine of Newfoundland, a fair amount of pine is yet standing in that Province, and the same may be said with regard to the territory adjoining the Hudson's Bay. It has not been satisfactorily explored, but what little is known of it does not warrant us in anticipating any great amount of valuable timber from that region; and whatever supply there may be will go but a short way to meet the wants of the settlers who are flocking into the treeless prairie country lying to the west of it.

The Province of Quebec possesses an aggregate of about 5,000,000,000 feet, Ontario 3,500,000,000, New Brunswick 1,500,000,000.

Whether the amount may exceed this estimate, which I have gathered from the best sources of information attainable, or not, there is one thing sure, that our magnificent forests of pine are about all gone, and the remark of Mr. Charles Gibb, "that our native white pine may yet be peddled in some parts of our country as a rare exotic, so scarce has it become," is certainly to be realized in the near future.

New Brunswick, that a few years ago sent the finest quality of pine to England, can only now ship a quality that realizes the same price as spruce, and the great Ottawa rafts that used to average from eighty to one hundred cubic feet per stick are now made up of pieces of which an average of fifty feet is only obtainable by culling over a large extent of territory. In fact, the size of the timber is so reduced that in Britain they are forced to buy our pitch pine of the South of the United States to get large-sized timber, and the sizes of the logs now made are so small that at an informal meeting of manufacturers of deals for the English market, held in Quebec, the subject was seriously discussed of reducing the size of stocks for pine deals from the present standard—eleven inches in width—to nine inches, the same as the spruce deal.

In point of fact, we are following the United States very closely in our efforts to get rid of our forests, and fully justify the remarks of a Glasgow journal that "Canada and the States are busy sawing from under them the high-reaching fortune-making branch on which, like conquerors, they are now sitting and overlooking the world."

I hardly dare attempt to describe the consequences of a dearth of timber, and every effort should be made not only to protect our existing forests, but to plant new ones, for no civilized country can do without timber. Even Great Britain, that is supposed to be finished up and requiring, as it were, only timber for repairs and that is enabled to obtain supplies at the cheapest rate from the north of Europe for the bulk of her wants, has to pay from $75,000,000 to $100,000,000 yearly for wood. What it would cost your country, which is yet to be built up, and consumes probably five times as much, can hardly be estimated, but this I am sure, that it would cost the United States more than its whole exports of grain and cotton and require the combined sailing tonnage of the world to procure it from any source known to me. In fact, dearth of timber reaching the industries of the United States and Canada, which is sure to take place before many years roll round, is one that can not be contemplated without the most painful apprehensions for the future of both countries.

In conclusion, I do not see that I can add any better advice than that of the Laird of Dumbiedykes to his son and heir: "Jock, when ye hae naething else to do, ye may be aye sticking in a tree; it will be growing, Jock, while ye're sleeping."

Mr. N. H. Egleston, of Williamstown, Mass., then addressed the meeting as follows:

I find myself here in a double capacity. As a delegate, invited by you as such, I have to thank you for your courtesy in inviting me, so far away from your place of meeting, and a stranger, to be with you and to take part in your important deliberations.

But I am here also in another capacity. I come with this commission from His Excellency, Governor Long, issued in conformity with the vote of the Legislature now in session at Boston, to bring to this Convention the salutation of the State of Massachusetts, and, so far as my poor abilities will allow, to represent the ancient Commonwealth on this occasion. I am here because Massachusetts is, and always has been, interested in whatever is of importance to the country at large. She counts herself a member of the living body politic of this great nation, and recognizes the truth that whenever any member of the living body suffers all the members suffer with it, and whenever any member rejoices, all the members rejoice with it.

But Massachusetts has not merely this general interest in the subject which has called this Convention together. She knows by practical experience the importance of preserving our forests. When the Pilgrims sighted Provincetown, and coasted along Cape Cod to lay the foundations of an empire, that great arm of land, as well as Nantucket and other islands on the south, was covered with a stately forest growth. But with the progress of settlement on those coasts, what has been done by man almost uniformly as he has migrated from the original cradle of the race in Asia Minor, was repeated. The forests were recklessly cut off, and the land became a desert waste of sand. So barren was much of the region made that the dwellers there have, in many cases, carried soil from the main land over leagues of intervening water in order to secure a proper return of crops from their seed-sowing. But now, in these later years, these barren stretches of sand are being reclaimed. All along that exposed coast, from the point of the Cape to Martha's Vineyard, may be seen plantations of forest trees, many of which have attained a growth sufficient to furnish marketable timber, while many others, more recently planted, are making effective wind breaks for the ordinary crops of the farm, thereby increasing the value of the land for tillage purposes.

But Massachusetts has other portions of her soil besides her sea coast, which makes the subject of forestry one of direct interest to her. From her eastern to her western limit she has tracts of rocky and mountainous character, or low and swampy districts, which are unfit for ordinary cultivation, and, in an agricultural point of view, almost valueless. But, planted and protected as woodland, these tracts may become of very great importance as a source of direct pecuniary return, as well as on account of their bearing upon the climate, health and the various economic industries of the people. The

State is turning her attention very earnestly to these waste and comparatively unprofitable portions of her territory. Bills are now pending before the Legislature looking to the adoption of measures for bringing the active and intelligent aid of the State in planting and protecting these waste lands.

I may mention also that several years ago our Society for the promotion of agriculture issued circulars on the subject of forest culture, and offered premiums for the encouragement of tree-planting on the large scale.

In the Arnold Arboretum also, at Brookline, Boston, under the charge of Professor Sargent, Massachusetts has a Forestry School, at least in embryo, and a garden of acclimation, where already are gathered thousands of trees from all parts of our own country and from the other side of the Atlantic, with a view to the practical study of their growth, and their adaptation to different soils and climates.

By its publication also the Arboretum has diffused throughout the country much valuable information in regard to tree culture, and influenced the legislation in several of our States upon this important subject.

Professor Sargent, as many know, is also charged with the preparation of the census returns in regard to the forests of the country. In discharging the duties of this office he has made, with the aid of a competent corps of assistants, a more comprehensive and careful survey of the timbered portions of the country than has ever been made before. Specimens of the various woods of the country have been gathered and a great deal of information in regard to their habits of growth and value for different purposes. Maps have been constructed showing the amount of timber that has been cut off, and the amount now standing in each State and Territory. Maps have also been constructed which indicate at once to the eye the extent of forest destruction by fires.

The remainder of the day was devoted to the reading and discussion of papers.

April 27th.

This day which was specially set apart for tree-planting, and designated as arbor day, was opened by a general session of the Congress, at 9 a.m., when Dr. Franklin B. Hough, Chief of the Forestry Division of the Agricultural Department at Washington, read a paper on "The Forestry of the Future," which was followed by one from David H. Bailey, late Consul-General of the United States in China, upon "The Droughts, Famines, and Floods in China." After some discussion on these papers the meeting adjourned.

In the afternoon the Congress took part in the holiday procession and general tree-planting which characterises arbor day. The day was kept as a general holiday by the citizens, the public buildings, and many of the places of business were gaily decorated, and an immense procession formed, which, accompanied by bands of music, proceeded to Eden Park, where trees were planted in honour of presidents, authors, pioneers, soldiers, sailors, etc. Trees were also planted in honour of Queen Victoria and Princess Louise.

The tree-planting ceremonies commenced with the firing of a signal gun and closed with the firing of a second gun, when the vast assemblage and the speakers proceeded to the grand stand, where President Loring addressed the vast audience in the following strain: He spoke of himself as a stranger in a strange land where he had been elevated to the high position of President of the American Forestry Congress. He said:

"We are now all better acquainted with each other than we were. We have awakened to a common interest. The forests are mutely appealing to us for aid against the hand of the destroyer, and they should and will be helped by the American people.

"After listening to the learned papers of the Convention, we are practically carrying out the theories by planting trees that will stand as monuments to the great men who founded the United States. We began with Columbus, who explored and reported back to Spain the discovery of a virgin country. Next we planted to the memory of a long line of citizen magistrates unequaled by any line of Kings. Among these magistrates we have George Washington, who first, as a surveyor, trod the forest, and afterwards led

the armies of the Revolution through mighty storms to a conclusion that gave us a free and united country.

"Beginning with him, we have an illustrious list. Thomas Jefferson, who said all men are born free and equal; the inalienable rights of all men are these: life, liberty, and the pursuit of happiness; he it was who taught nations that all men could come here and be protected under the flag of freedom. Nor should we forget Abraham Lincoln, who laid down his life for the Nation, but not until he knew that loyal soldiers had saved the Nation.

"Passing on, we come to an example of truth and fidelity that Ohio should never forget—James A. Garfield. Where is there a mound more sacred than his? Having done all this, we must remember the country from which we sprang—Mother England. One tree to the Queen, and one to the royal family, and for them and their country we ask continued prosperity."

The next speaker was Cassius M. Clay, who said:

"All of you who have read history—and who has not?—will have your hearts and minds reawakened to the beauty and appropriateness of this scene, in which so much is said and done to the memory of the great of our land—nay, of the distinguished in distant lands. I have had the great honour of dedicating a tree to Christopher Columbus, our country's discoverer, and I appreciate that very great honour."

Several other distinguished speakers also addressed the audience.

The occasion was one of unusual interest. Eden Park presented a beautiful appearance with its groups of men, women and children in their holiday attire, scattered about over its undulating surface, gathered as their inclination led them—some to the grove in memory of the Presidents of the Republic; others to that which commemorated her men of letters, or her brave soldiers fallen in battle, or the early settlers who laid the foundations of empire amid the primeval forests. The fresh verdure of advancing spring gave a charm to the ever-varying landscape, and the stirring strains of martial music blended harmoniously with the hum of merry voices.

It was a happy thought thus to attract public attention to an important, but hitherto unconsidered, subject; to associate in the public mind the planting and conservation of trees with honoured names and historic events; to woo the weary artisan from his work-shop, the merchant from his ledger; to call out the children from the schools, and the ladies from their houses, and bring them into the groves to make a festal day and gain perhaps their first thought of forestry amid scenes of joy and merry-making, intermingled with eloquent addresses and soul stirring music.

The setting apart of a day in the early spring time for the planting of trees in public parks, on the streets and avenues of our towns and cities, and along the sides of country highways, in which the planting takes place in connection with such social enjoyments as make the day one of pleasant recreation, is a means of attracting public attention, and of creating a public sentiment in favour of the culture that deserves careful consideration.

Closing day brought the proceedings at the park to a termination, and in the evening the members of the Forestry Congress were invited by the ladies of Cincinnati to a reception in Music Hall, in which song, and speech and instrumental music were most happily blended, the utterances all tending to keep in mind the subject of forestry in one or another of its various aspects, and to fasten it in the memory with pleasing associations.

April 28th.

The Congress met at nine o'clock in the morning in Dexter Hall, and decided that the next meeting should be held at Montreal, Canada, on the 21st and 22nd of August, 1882.

The Canadian delegation expressed their thanks to the Congress for the honour conferred in appointing the next meeting to be held in the Dominion, and for the very kind invitation which had been extended to Canadians to participate in the deliberations of this meeting. "We have," said the speaker, "been so cordially welcomed, made the recipient of so many delicate attentions, and have enjoyed so much instruction, that we

could not leave, as we shall be obliged to do this evening, without taking an opportunity of expressing our thanks.

"It has been a serious problem with us how to interest the general public in the subject of forestry, so as to secure the preservation of what yet remains, and the replanting of places that have been needlessly denuded of trees. But you have taught us a lesson we shall strive to learn to our profit. Yesterday will not soon be forgotten by us. You have brought out your senators, legislators, governors, lawyers, clergymen, merchants, and artizans, your wealth and beauty, to celebrate the planting of trees and lend their influence to the promotion of the objects of your association.

"We thank you also that you propose to hold your next meeting within our Dominion. We shall be glad to welcome you and to show our gratitude by our works on that occasion. I know that the residents of Montreal will exert themselves to make your sojourn with us pleasant, and will give you a most hearty welcome."

The day was fully occupied in the reading and discussion of many very interesting and valuable papers on the *relation of forests to water supply*, the *profits of durable trees* the *insect enemies of trees*, etc.

The Forestry Congress adopted a resolution, with instructions that the same be forwarded to the President of the Senate and the Speaker of the House of Representatives, requesting the Congress of the United States to establish at the several agricultural institutions, both state and national, experimental forestry stations, to be conducted on the same general principles as adopted in Germany.

A committee was appointed to report at the next meeting upon the practicability of securing the appointment by the respective states of Forestry Commissioners; such committee to consist of Dr. F. B. Hough, Cassius M. Clay, Dr. J. A. Warder, Wm. R. Lazenby, Wm. J. Beal, Prof. Jas. F. Stafford, and C. S. Sargent.

Also a committee composed of Prof. Mohr, Wm. Little, Horace Wilson, O. N, Egleston, Henry C. Signer, and R. C. Kudzie, to report upon practical measures to prevent the continued destruction of forests by fire, and the inroads of cattle.

In the afternoon some of the delegates attended at Lincoln Park to participate in the tree-planting exercises there. On this occasion Mr. Emil Rothe delivered an address so full of instruction and timely warning, that we here present it for your perusal. He said:

"Nature is the enemy as well as the friend and nurse of man. Every progress in culture and toward comfort is the result of man's combat against wild nature. His first elevation over the animal, the construction of a dwelling better than a cavern or a hollow tree and the procurement of the most primitive clothing, necessitates destruction of vegetable and animal life. The establishment of even the rudest home requires the felling of trees, or at least the cutting or breaking off of branches, and agriculture commences with destruction of the original vegetation and with tearing up the virgin soil. In the struggle with nature the physical and mental qualities of man are put to the first test. Contemplation of nature and observation of its laws are necessary to find means for aggression and defence. The multitudes of people are raised on the open plains, while the men of strong body and mind come from the forests and mountains, where nature offers the most obstinate resistance. But when that grade of culture is reached where a man learns to put the powers of nature to his use, it should be supposed that he would then begin to appreciate the value of animal and vegetable life, and use the gifts of nature with some consideration of the laws of their reproduction and with some sense of economy and saving for the future; but reckless selfishness and the spirit of destruction seem to be stronger in him than reason and forethought.

"History establishes the strange fact, that until a very recent period nearly all civilized nations have very imprudently and often wantonly wasted the natural resources of their respective countries, until the greatest part thereof was exhausted beyond the possibility of reproduction. They all knew well enough that forests were indispensable, they judged from the commercial as well as the æsthetical standpoint of view, but they made no efforts to preserve, much less reproduce them. Even the high cultivated Romans, who could not have failed to be aware of the final consequences of the destruction of the forest, which was steadily going on in the so-called classical period, never took pains to replace the rapidly disappearing native trees.

"In ancient times forests were in some instances preserved and extended by means of systematical planting of trees in East India and in Persia, either to serve the purposes of anchoretic Hindoo priests or as hunting grounds for the princes. The famous *paradasos* which Xenophon praises for their grandeur and beauty, were in fact nothing but the well-kept game-parks of the kings and satraps of Persia. Likewise the abundance of natural timber in some parts of Germany may to some extent be ascribed to the hunting passion of the princes and noblemen, who in early times took possession of the forests and protected them and the game therein contained against trespass by rigorous and often extremely cruel laws. Though it was in Germany, noted for the inclination of its people to contemplation, thinking and economy, where the idea to preserve existing forests and to create new ones by systematic planting, was first conceived and practically carried out for general public purposes.

"For more than a century forestry has been recognized there as a science, a profession and a regular branch of the public administration. Frederick II., one of the wisest kings that ever sat on a throne, gave it every possible aid and encouragement, well knowing that the systematical culture of forests would greatly contribute towards the general welfare of the country, and by-and-by become a source of a regular and large revenue. The experience of a hundred years has fully endorsed the philosopher of Sans-Souci. Unlike too many other countries, in which an alarming deterioration of the soil and climate is only too clearly perceptible, Germany has gained in fertility; vast tracts of formerly worthless land, such as the Limburgher Haide, the sandy districts of the Lausitz and Altmark and the swamps on the Wartha and Vistula Rivers have been converted either into grain fields or meadows, or into well-stocked forests. Some writers pretend that the climate of Germany has actually improved, but so much is certain, that it has not changed for the worse. It is generally conceded that were it not for the wise preservation of the natural growth of timber and for the extensive cultivation of natural forests, Germany, a country of far less natural resources than either France or Spain, could not sustain fifty millions of people, perhaps not half that number.

"Other gentlemen of better learning and better versed in the sciences of meteorology and climatology have, at this occasion, in detail explained the importance of forests as attractors, moderators and preservers of humidity, as regulators and equalizers of the temperature, as protectors and fertilizers of the soil, as purifiers of the atmosphere, as distillers of ozone, and as the subject of æsthetical and poetical contemplation. My remarks will be confined to facts established by history."

Palestine.

"At the time when Joshua conquered the Promised Land milk and honey were flowing in Canaan, that is, it was a country of wonderful fertility, blessed with a delightful climate. Both ranges of the Lebanon and its spur mountains were then densely covered with forests in which the famous cedar predominated, that stately tree so masterly and poetically described by the Psalmist and by the prophets. The large and continually increasing population of Palestine enjoyed comfort and abundance during many centuries. But a gradual devastation of the forests, which was finally completed by the Venetians and Genoese, brought about a general deterioration of the country. The hills of Gallilee, once the rich pasturing ground for large herds of cattle, are now sterile knobs. The Jordan became an insignificant stream, and the several beautiful, smaller rivers, mentioned in the Bible, now appear as stony runs leading off the snow rainwater, but being completely dry during the greatest part of the year. Some few valleys, in which the fertile soil, washed down from the hills, was deposited, have retained their old fertility, but the few cedar trees remaining as a landmark around the Maronite convent on the rocky and barren Lebanon, look lonely and mournfully upon an arid and desolate country, not fit to sustain one-sixth of such a population as it contained at the time of Solomon."

Greece.

"What became of Greece, beautiful Greece, where in the enjoyment of an eternal spring, gods, demi-gods, heroes and men used to pass their happy time in comfort and

idyllic contentment. Mild zephyrs gently moved the glossy leaves in the vast forests, wherein fawns, satyrs and nymphs joined in frolicsome dance. Umbrageous groves overshadowed the silvery springs on the verdant shores of which Pindar and Sappho listened to the sweet song of the nightingale. The poetical disposition of the Greek people led them to contemplation and love of nature ; their religion was based upon personification of the latter. Each species of tree was dedicated to a certain god ; the oak to Zeus, the spruce to Poseidon, &c. In all parts of the country were sacred groves. In every tree the dryad, an elf-like being, was supposed to live ; the flowing sap of a wounded tree was the blood of the dryad, who died with the tree. There was no waste of the forests in the classical period of Greece. They were destroyed in later centuries. The gods and goddesses, majorum and minorum gentium, have disappeared with them. Instead of balsamic zephyrs the icy boreas and the suffocating south wind blow unhindered over the parched fields of Attica and over the barren hills of the once paradisaical Arcadia, now thinly populated by a poor and degenerate people."

Spain.

"Under the reign of the Moorish Caliphs the Iberian peninsula resembled a vast garden, yielding grain and fruit, of every known variety, in the most perfect quality, and in endless abundance, and thickly populated by a highly cultivated people. But then the sierras and mountain slopes were covered with a luxuriant growth of timber, which was afterwards wantonly destroyed under the rule of the Christian Kings. Large herds of half-wild goats and sheep prevented the spontaneous growth of trees on the neglected lands. Now nearly all the plateau-lands of Spain, being fully one-third of the entire area, are desert-like and unfit for agriculture, because of the scarcity of rain and the want of water. Another one-third of the territory is covered with worthless shrubs and thornbushes, and affords a scanty pasture for the merino sheep: the number of which is decreasing from year to year. The once delicious climate has become changeable and rough, since there are no more forests to break the power of the scorching Salano and the cold Galego wind. The average depth of the fine rivers that cross Spain in all directions has greatly diminished. The Government well aware of the causes of the deterioration of the soil and climate, has lately made earnest efforts, partly to replant the old forest grounds, but has met with little success, it being very difficult to make trees grow on former timber land, which has been laying waste for a longer time. It will take a full century's time and necessitate an immense outlay of money to restock Spain with sufficient timber."

The Eastern coast of the Adriatic Sea.

"On the entire eastern coast of the Adriatic Sea, in Dalmatia, Herzegovina, and Montenegro, the same evil consequences of the devastation of the natural forests are clearly perceptible. These coast lands were very fertile until the Romans, having used up their own timber, took it from the other side of the Adriatic, and until millions of Illyric trees were converted into pillars and rammed into the lagunas to make foundations for the houses, palaces and churches of Venice. What was left by the lumbermen was destroyed by the camp-fires of careless herdsmen, and here also the goats did their pernicious work in preventing spontaneous growth. The long mountain range running along the coast, which was yet well timbered in the time of the great Constantine, is now destitute of all soil ; the naked lime-roads, reflecting the hot rays of the sun, warn the stranger not to enter the sterile and inhospitable country hardly worth the loss of human life and treasure which the subjection of its unruly inhabitants now costs the house of Hapsburg."

Sicily.

"Let us look at Sicily, once the great grain reservoir for Rome. Since the island of plenty was despoiled of its forests, it gradually lost its fertility and the mildness of its climate. The ruins of proud and opulent Syracuse lay in a desert, covered by sand, which the hot sirocco carried over the Mediterranean Sea from Africa. A few isolated, well-watered and carefully cultivated districts of very limited extension, is all that is left to remind the tourist of the by-gone glory of Sicily."

Italy.

"When the Appenine and Sabinian Mountain range and its slopes were covered with its natural growth of trees, the now detested Roman Campagna, and the largest part of the Pontine swamps were a beautiful section of country. They were then adorned with the sumptuous summer residences, villas, parks, flower and fruit gardens of the Roman aristocrats. After the destruction of the forests, the whole region became unhealthy, and almost absolutely uninhabitable, on account of the malarious gases emanating from the soil. Formerly these were absorbed by the leaves of numerous trees, now they fill the air and infect even the very heart of St. Peter's eternal city."

France.

"The devastation of the forests which took place in France towards the end of the last century, caused the impoverishment of several formerly fertile districts in less than a quarter of a century. The French Government has lately adopted a regular system of forest planting, which proves a great success, and which in the course of time will undoubtedly repay the great expense already incurred, and yield a large revenue to the public treasury."

America.

"We Americans boast of inexhaustible natural resources. Our speculators and vain glorifiers ridicule the warnings of thinking men and political economists. They point to the extensive timber regions in the unsettled parts of the country, in which even now the trees are really an impediment to cultivation. But the supply of lumber and the existence of large timber districts in distant territories is not the only desideratum. It is certainly no equivalent for the want of it in the early cultivated States. The equal distribution of the forests over the whole country is what is needed for the preservation of comfortable climate and fertility of the soil."

Ohio.

"Let us look a moment at our own State of Ohio. 'As long as we and our children and grandchildren may live, lumber will be obtained for a reasonable price from Michigan and Canada, if our own supply should give out.' Such is the argument of the short-sighted men who value the tree solely by the quantity of cubic feet of lumber that may be cut from it.

"That is the consolation of the all-grasping and swallowing speculator, who gets angry when looking at the moon, because he can not take it down from the sky, bring it before a circular saw, cut it to pieces, and sell it at the exchange or in the market by the yard or pound. Now, have you never tried to find out why Southern Ohio has ceased to be the great fruit country, *as it was formerly known?* Why is it that we can not raise any more peaches in our State, while they used to bring sure crops not more than a quarter of a century ago? Why is it that even the hardy native Catawba grape, which used to yield so abundantly in this region, does now hardly pay for its cultivation? What is it that makes our climate, once so favourable for mankind and vegetation, more unsteady from year to year? Look at the woodless hills of Southern Ohio, and you have the answer. Let the hills be deprived of all the rest of the protection which the forests afford, and half of the area of this State will be sterile in less than fifty years. The rain will wash the soil from the hill-tops first, and then from the slopes; the limestone, which is now covered with productive humus, loam and clay, will be laid bare; the naked rocks will reflect the rays of the sun and increase the summer heat; the north storms will blow unhindered over the country, and every change of the wind will cause an abrupt change of the temperature. The rainfall will be diminished and become irregular. Snow and rain-water will at once run down in the valleys and cause periodical freshets, which will ultimately carry away the best part of the soil, even from the valleys. Such will be the unavoidable result of further devastation of the timber."

The Northwest.

"I had an opportunity to observe and study this result in the Northwest. Thirty years ago steamboats drawing six feet of water, made regular trips on the Upper Mississippi up

to St. Paul. Now the navigation with boats of half that draught is uncertain enough. Nearly all the tributaries of the Upper Mississippi have also lost one-half, or even more, of their former supply of water. Inundations in the spring are now frequent, while now in the summer time the depth of many of these rivers average hardly more inches than it could be measured by feet thirty years ago. Water powers, which were formerly deemed to be inexhaustible, have entirely been abandoned, or their failing motive power has been replaced by steam. In the remembrance of the older settlers the climate of Wisconsin and Minnesota was remarkably steady, the winters were long and cold, the supply of snow ample and regular, and late frosts in the spring were unusual. Now the inhabitants complain of abrupt changes of the temperature in all seasons of the year, and of the irregularity of the snow-fall. The Legislature of Wisconsin has already paid attention to these alarming facts, and has taken the preservation of existing forests, and the establishment of artificial ones, in earnest consideration. By a resolution recently passed, it asks of the National Government the transfer for that purpose, of all unsold public lands to the state, which are now despoiled of their timber by thievish lumbermen."

Arizona.

"In the Territory of Arizona an immense number of deserted Indian dwellings carved out of the rocks were recently discovered. The former inhabitants of the same must necessarily have been a sedative people, devoted to agriculture, but the whole district is now desert like, there being no supply of water, and hills as well as plateaus and valleys being dry, stony and nearly destitute of vegetation. This can not have been the condition of that district when it was densely populated by hundreds and thousands of Indians. Now the only plausible solution of the ethnographical enigma which is here propounded to us, is the following: The hills and slopes there were once stocked with lumber, which was wasted by the inhabitants, whereafter the same deterioration of the country gradually took place which we notice in Palestine, Greece, and Sicily, and finally the people had to emigrate to avoid starvation.

"But enough of the warning examples of history.

"It is not too late for repairing all the damage that has been done in America by the devastation of our natural forests. A regulation of the use of the timber may be effected without any injury to the legitimate lumber trade, and the replanting as well as the establishment of artificial forests, may undoubtedly be made profitable for private as well as for public enterprise. If it is remunerative to acclimatize and extensively raise American trees in Germany and France, where the soil is much higher in price than here, why should it not be lucrative to cultivate them in those parts of the United States in which the timber is scarce and precious? They grow quicker here and to greater perfection than anywhere else. Nature has lavishly provided this country with an uncommonly large number of the most valuable species of trees. There are not more than thirty-five species and distinct varieties of native trees in France which attain a height of over thirty feet, not more than sixty-five in Germany, but over one hundred and fifty in the upper part of the Mississippi Valley alone. All Europe possesses not a single native walnut tree. (The so-called English walnut is of Asiatic origin.) We have nine varieties of hickory and two of walnut proper. You may search all the world over in vain to find a sort of timber which, in general usefulness, could rival with our hickory tree. Our walnut and oak varieties alone outnumber all the varieties of trees native to France and Spain.

"A benign nature has lavishly provided for this country; but does that give us a right to waste these blessings, destined for the human race of all future ages, within the short life of a few generations, like spendthrifts? Shall we adopt the most detestable motto of a modern Sardanapalus, '*Après nous le déluge!*'—anticipate everything and leave nothing for those who will come after us? Will America's pride bear the humiliating prospect that the immense work of culture, which so far has been achieved in this country by the most intelligent, independent, progressive and energetic of all Nations, shall soon be frustrated by the unavoidable consequences of our greedy mismanagement of the natural resources of our country? Shall the future of this great Republic be made uncertain by a gradual deterioration of soil and climate, or shall it forever remain the happy and comfortable home of the free? Is not the care for future generations one of

the most solemn duties imposed upon us by laws of humanity and morality? Are we worthy to enjoy the bequest of our forefathers if we are not just and liberal enough to provide for our descendents?"

Such were some of the prominent features of the first session of the American Forestry Congress, held in Cincinnati, in April, 1882. It is evident that thinking men believe that it is now high time to pause and consider what the destruction of the forests by the axe of the lumberman and settler, and by the yet more extensive and deadly sweep of forest fires, is rapidly bringing us; and whether means may not now be devised to regulate the cutting of timber and prevent its waste by fire, so as to prevent the disastrous results which the denudation of the country would soon bring to pass. Judging from the tone of the remarks and suggestions made, it would seem to be the general impression that the first step to be taken towards the accomplishment of this very desirable object, is to create an enlightened and healthy sentiment on the whole subject of forestry by the dissemination of correct information, thereby awakening attention and convincing the public mind of the necessity and benefit of preserving our forest wealth from destruction.

This important subject will be more fully discussed after the report is given of the second meeting of the American Forestry Congress, held in Montreal.

Respectfully submitted.

WM. SAUNDERS,
D. W. BEADLE,
WM. BROWN,
} *Delegates.*

REPORT OF DELEGATION APPOINTED TO ATTEND THE AMERICAN FORESTRY CONGRESS HELD IN MONTREAL, PROVINCE OF QUEBEC.

To the Honourable the Commissioner of Agriculture:

SIR,—The delegation appointed by you to represent the Government of Ontario at the meeting of the American Forestry Congress, held in Montreal, August 21st—23rd, 1882, beg to submit the following report:

We arrived at Montreal in time to be present at the opening of the Congress, and to greet many of the gentlemen who were present at the session in Cincinnati, and other distinguished gentlemen interested in the subject of Forestry, as they gathered at the commodious rooms, No. 132 St. James street, provided by Mr. Little, Chairman of the Committee of Management.

The Forestry Congress began its opening session at two o'clock on Monday afternoon.

In the absence of the President, the Hon. H. G, Joly, one of the Vice-Presidents, was requested to act as temporary President of the Congress.

Over two hundred gentlemen were present, comprising, besides members of the Congress, many of the leading citizens of Montreal, with several influential gentlemen from other parts of the Province and Dominion.

Mr. C. E. Belle, Crown Timber Agent for the Province of Quebec, offered for the inspection of the Congress, a box containing forty-four specimens of Canadian wood, natural on one side and varnished on the other. They were greatly admired by those present.

The following is a list of papers entered on the programme:

1. Forest Fires.....Joseph S. Fay, Wood's Holl, Mass.
2. The Distribution of Hard Wood Trees in the Gulf Region of the Southern States.....Dr. Charles Mohr, Mobile, Ala.
3. Tree Planting by Railroad Companies, Franklin B. Hough, Ph.D., Lowville, N. Y.
4. The Rational Method of Tree Planting..N. H. Egleston, Williamstown, Mass.
5. The Russian Mulberry.....D. C. Bunson, Topeka, Kan.
6. The Larix Europea (European Larch), its quick growth, adaptability, propagation and culture.....David Nicol, Cataraqui, Ont.

7. The Coppice for the Village and Town.....M. C. Read, Hudson, O.
8. Forest Trees Most Suitable for Streets, Lawns and Groves,
J. Beaufort Hurlbert, Ottawa, Ont.
9. The Destruction of Forests and Tree Planting,
John Dougall, Editor of New York *Witness*.
10. The Introduction of Trees and Shrubs at the Ontario Experimental Farm,
Prof. Wm. Brown, Guelph, Ont.
11. A Few Thoughts on the necessity for a certain portion of each Farm being left in Forests....J. Beaufort Hurlbert, L.L.D., Ottawa, Ont.
12. Forest Economy of Canada.....Stewart Thayne, Ottawa, Ont.
13. Experimental Plantation of the Eucalyptus, near Rome,
Franklin B. Hough, Ph. D., Lowell, N.Y.
14. Conditions of Forest Growth.....Bernard E. Fernow, Slantington, Pa.
15. Lessons to be Learned from the Forests of Western Asia,
Prof. H. S. Osborne, Oxford, O.
16. Borers in Forest Trees.....Rev. Thomas W. Fyles, Cowansville, Quebec.
17. How Farmers May Grow Forest Trees from Seed,
D. W. Beadle, St. Catharines.
18. On the Growth of Black Walnut Timber in Ontario..Thomas Beall, Lindsay.
19. On the Growth of Poplar Trees for the Manufacture of Paper and Charcoal,
W. Saunders, London.
20. A Few Practical Remarks from the Lumberman's Standpoint,
J. K. Ward, Montreal.
21. Oaks of Hardin County, O.....W. F. English, Mount Victory, O.
22. Tree Planting for Railroads.....Dr. John A. Warder, North Bend, O.
23. Timber Trees of the Black Hills.....Robert Douglas, Waukegan, Ill.
24. Remarks on the Canadian Cultivation of the Catalpa Speciosa,
Robert Burnet, Pictou, N.S.
25. The Coniferous Trees of the United States and Canada..Dr. George Vasey, Botanist of Department of Agriculture, Washington, D.C.
26. Black Locust Growths.....Dr. John A. Warder, North Bend, O.
27. Experiments in Tree Planting on Cape Cod,
Joseph S. Fay, Woods Holl., Mass.
28. The Ash.....Arthur Bryant, Princeton, Ill.
29. Larchmere, a Plantation on Drifting Sands,
Dr. John A. Warder, North Bend, O.
30. Three Motion Plan of Planting.....Robert Douglas, Waukegan, Ill.
31. Extensive Planting by Shelter-belts..H. M. Thompson, Preston Lake, Dak.
32. Classification of Oaks.....Dr. John A. Warder, North Bend, O.
33. A Western Greeting.....James T. Allen, Omaha, Neb.
34. Forest Tree Plantation.....B. F. Peck.
35. Trees, Tree Planting, &c.....J. A. Mathewson, Little Metis.
36. Planting on the Plains, &c.....H. M. Pennel, Russell, Kan.
37. Timber Culture a National Necessity.....D. C. Schofield, Elgin, Ill.
38. Rural Improvement.....B. G. Northrup, Clinton, Conn.
39. The Commercial Value of Pruning.....John S. Hicks, Roslyn, N.Y.
40. Apology for the Pioneers.....John W. Caldwell, Cincinnati, O.
41. Living Fence Posts.....Wm. H. Ragan.
42. Roadside Tree Planting.....W. A. Hale, Sherbrooke, Que.
43. Letter upon Forestry.....D'Ailly, Malvern, Ark.
44. Fungi Injurious to Forest Trees.....Byron D. Halstead.
45. Forests in Connection with Water, as Aids to Climatic Amelioration,
T. T. Lyon, South Haven, Mich.
46. Forests of the United States, as shewn by the Census of 1880,
N. H. Egleston, Williamstown, Mass.
47. Forest Cultural Survey, &c.....General William Burns, U. S. Army.
48. Economic Tree Planting: How and Where.....B. Gott, Arkona, Ont.

49. The True and False in Arboriculture.....William Robb.
50. The Mills of West Fork.....J. Jenkins, Winona, O.
51. Individual Effort in Preserving and Propagating Trees,
Dr. Reginald A. D. King, Compton, Que.
52. Profitable Forest Culture.....C. E. Thorne, Springfield, O.
53. What to Plant for Forest Trees, for Groves and for Wind-Breaks,
Suel Foster, Muscatine, Iowa.
54. Canada's Forests, and her Future as a Steel Producer,
Edward Haycock, Ottawa, Ont.
55. Climatological Range and Geographical Distribution of Forests, and the Climates Favourable to Them ..J. Beaufort Hurlbert, LL.D., Ottawa, Ont.
56. Plan of Instruction in an American School of Forestry,
Prof. Adolph Leue, Cincinnati, O.
57. The Relation of Forests to Agriculture,
A. G. Humphrey, M.D., Galesburg, Ill.
58. Forestry from a Hygienic Standpoint....Henry Howard, M.D., Montreal.
59. Some Notes and Remarks on the Denudation of Our Forests,
G. L. Marler, Montreal.
60. How the Forest of the Eastern Townships was Broken Up — A Brief History.....Rev. T. W. Fyles, Montreal.
61. "Woodman Spare the Tree"—The Forestry of the Niagara Section,
J. R. Martin, Cayuga, Ont.

At the conclusion of the preliminary business the Congress proceeded with the reading and discussion of papers, which occupied the remainder of the afternoon.

In the evening a meeting was held in the Queen's Hall, which was well-filled with an appreciative audience, including a large number of ladies.

The platform was tastefully decorated with rare potted plants in full bloom, and upon the table were ranged bouquets of choice exotics. In a conspicuous position behind the President's chair was the legend "Woodman, Spare the Tree," and on either side of this inscription were shields bearing the words "American Forestry Congress, 1882," and surrounded by the American and English flags entwined together in a manner emblamatic of the friendly union existing between the two nations. While the audience were taking their seats music was discoursed by the City Band.

The Chairman, in opening the meeting, said the duty which had been imposed upon him was a most pleasant one. He was called upon to welcome and offer the freedom of the city to the gentlemen who had come to Montreal for the purpose of discussing questions of great importance, not only to the Dominion of Canada but to the whole continent of America. He would merely briefly introduce to the meeting those gentlemen who were now on a visit to the city, and he hoped they would receive a hearty welcome from all the citizens of Montreal.

The Hon. Mr. Joly was first called upon to address the meeting. He said that the task which had been allotted to him was a pleasant one; that task was to welcome their friends, for he called friends all those men who were united together in what he would attempt to show was a great cause, and a cause that deserved the sympathy of all. He was glad to be called upon to welcome those men; those who came from the United States, and those who came from Ontario, New Brunswick, and all the other Provinces. He might also say that the Government of the Province of Ontario took a deep interest in the subject of Forestry, and had deputed four men of experience on this subject to represent it at the meeting. He was particularly glad to see so many ladies present, which afforded ample evidence that the question was one of great interest, and not so prosaic as generally supposed, and he would endeavour to treat it in a manner worthy of his fair auditors. It was customary for the Chairman at such a meeting as this to explain in a few words the object of the meeting. This meeting was held, he might say, in the interests of Forestry. Now, what did Forestry mean? He knew that in the Province of Quebec, in the land of forests, so to speak, this question was not one which awakened a very powerful echo in the hearts of its inhabitants. Time was when we thought that we

had an inexhaustible supply of wood, and we pointed with pride to the rafts of timber which floated down our rivers, and to the vessels which took our lumber abroad. We thought that we supplied not only Great Britain with lumber, but also a large part of the Continent. Canada, however, did not send to England one-fourth of the lumber which she consumed, while what we sent to other parts of Europe was but as a drop in the bucket. Fifteen years ago a certain gentleman raised the warning voice against the ruthless destruction of the forests. He referred to Mr. James Little of Montreal. Mr. Little ought to be here now in the speaker's place. But Mr. Little was eighty years of age, and his physical strength did not allow him perhaps to stand the fatigue which he might have to undergo. But he was sure Mr. Little must be proud now to see the Province of Quebec and the whole world acknowledge that he was right when he was trying to stop the wholesale destruction of these forests. He (Mr. Little) was laughed at then, but he was vindicated to-day. Even two hundred years ago this warning had been given. He had seen in old manuscripts that the former French Governors in 1690 had recognized the danger which threatened our forests. Where were our forests now? Many old homesteads that have been handed down from father to son, generation after generation, have been sold, and why? Simply because there was not a stick of firewood upon them. But people asked now, where does all the lumber come from which we see passing down our rivers? It comes from the height of land which divides the water shed of the St. Lawrence and the water shed of the Hudson's Bay, 200 or 300 miles away. A few years ago there seemed to be an inexhaustible supply of timber between the Ottawa and the St. Maurice; but now people met together disputing with one another over the timber in the heart of that region. In Ontario the same state of affairs also existed. There was then, it would seem, some need for foreseeing, and for the education of the public in this regard, and the large audience which he saw before him spoke well for the interest that would in future be taken in this subject. About ten years ago Mr. Levesque Daillebout was instrumental in starting a Forestry Association in this Province, one of the laws incumbent on its members being that they were bound to plant a certain number of trees every year. But unfortunately that association did not live very long. There were those who said that it was all very well for the older countries to talk of planting timber, but in a country like Canada, where nature had planted forests with such a liberal hand, what was the use of talking about planting trees? But they must consider that there were countries newer than Canada where this question had been taken up—such as New Zealand, Algeria, etc.; they could even call Montreal old as compared with the United States. About sixty or seventy years ago, immense tracts of sterile, sand plains near Bordeaux, France, were planted with trees, and turned into forests, and as a consequence, to-day the people of that place manufactured everything that timber can produce. They had, not fertile fields, but fertile forests, which would even yield a more increasing revenue. What could we do in this country, and what ought we do? There were two ways of working in this matter—one was by protecting the forests we have now, and another was by creating new forests, and they would not expect that any one man would consider these two questions from the same point of view, some being in favour of protecting our present forests, while others were in favour of planting new forests. But both the preservation of our timber and the creation of new forests in regions where they do not exist were absolutely necessary. The greatest enemy, however, which they had to fight was forest fires, and they had to consider what they could do to fight those fires, and to prevent the total destruction of timber limits. He might perhaps mention his own experience in cultivating trees. He had under his control about 100,000 acres of land, on which he turned out from 35,000 to 40,000 spruce logs every year, and by following one rule—that is, not to allow a tree to be cut under twelve inches—and by observing this rule he could have an everlasting supply of spruce. He desired every farmer to know that with courage, perseverance and a little intelligence, he could have an ample supply of timber, not only for firewood, but for building purposes, so that not only himself but his children after him would have a steady and continual supply. He spoke at some length on the subject of the Black Walnut tree, which grew, he said, three times as fast as Pine and five times as fast as Spruce, and was easy to cultivate, except that it required very rich soil. He had had eight years' experience in the cultivation of the Black Wal-

nut. His experience had taught him that it required deep rich soil. If any of his audience had farms on which there was damp soil, they could grow such trees as the Tamarac, if they had light sandy soil, they could grow Pine, Spruce, etc.; but if they had good, rich, deep soil, they would waste neither their time nor their land in cultivating Black Walnut. He was authorized by a statement of Prof. Hough, Chief of Forestry at Washington, to say that in fifty years one superficial acre would support 680 trees under the most favourable circumstances. He would, however, only take 400 Black Walnut trees to the acre. Now the average growth of Black Walnut in Canada, according to his own experience, was half an inch a year, although on the shore of Lake Simcoe, where the soil was exceedingly rich, they increased nearly an inch in size per year. But suppose their average increase was half an inch, consequently in forty years, twenty-inch trees would be secured. Black Walnut at present was worth $1 per cubic foot, so that calculating each tree at twenty-five cubic feet they would have $10,000 as the result of forty years growth upon one acre of land. According to Prof. Macoun's report, our Western Prairies were once covered with a thick growth of timber; why should not these prairies be covered again, at least partially with forests? Some people were of the opinion that our governments should take hold of this matter, as men's lives were too short, but he could assure them that if men's lives were short, government's lives were still shorter. But a man should do his duty, and not be calling upon the Government to do his work. In some of the States very liberal premiums were given to encourage the planting of trees, and he thought the Government of Quebec might well take similar action. At the last Session of the Legislature he introduced a measure looking to the establishment of an "Arbor Day," like that existing in the United States. In this respect we might well follow the example of our practical neighbours. Even in the State of Michigan the Governor issued a proclamation establishing an "Arbor Day," although that State produced more lumber than the whole Dominion. The subject of forestry was a hobby with him (Mr. Joly), and he could assure his audience that it was one which no one could take up without becoming enthusiastic over it. If it was an evidence of faith in Divine Providence for the farmer to sow his seed in the spring time, in the confidence of reaping the harvest in the course of a few months, how much greater evidence of faith was it to plant young trees for which half a century or a century were required to bring them to maturity?

Prof. F. B. Hough, chief of the Forestry Division of the Department of Agriculture, Washington, then delivered an address. He said:—

Mr. Chairman, Ladies and Gentlemen:

In considering this subject of Forestry from various points of view, we find it a very complex one, involving many principles in science, and coming directly home to matters of practical business and the affairs of daily life. It is therefore a subject that should receive attention both from the man of science and the man of business, the one to study the principles of knowledge that are involved, and the other to apply them to use.

When we consider that our native supplies of timber were largely beyond our wants, and that a part must be removed before agriculture could be introduced, it is not, perhaps, surprising that the habit of destruction should have continued beyond the limit where it should cease. It has become apparent to thoughtful men that this point has been reached and passed and that unless measures are seasonably adopted for the maintenance and renewal of our forest products we must, in the near future, feel the great inconvenience that will result from their want.

It was for the direct purpose of awakening a public interest in this question and for devising the means whereby these dangers may be averted that the American Forestry Congress has been organized, and in pursuance of this intention I invite your thoughts to some points that will, I trust, be deemed worthy of notice, as tending to secure this object.

In the case of forest products, their weight and bulk at first limited their transportation to the floating upon streams, and the extent of demand and the price were measured by the distance they were to be carried to the place where they were to be used.

A forest covered with timber trees, alike in dimensions and quality, was far from being uniform in value, so long as there was no other mode of bringing it to market than that of drawing it by teams to a bank, where it could be floated upon streams. The parts nearest to floatable streams were first taken, and then successively the rest, until, perhaps, the more remote remained without sale, for no other reason than the cost of moving, which would equal or exceed its market price.

But in recent years, since the introduction of railways, the facility for their construction, and a marked increase in the demand and in the prices of lumber, have led to their construction into timbered localities that could not formerly be reached, and often with the intention of removing their tracks when this supply was spent. In a level region like that in Michigan and in parts of the Southern States, where there were no serious difficulties in the way of construction, these railroads have rapidly exhausted the supplies along their route, and are every year narrowing down and annihilating the woodlands through which they pass, until we can now in many places almost see the end of supplies which but a few years ago were looked upon as sufficient for indefinite use.

By means of railways the lumber from these regions, either in its rough form or manufactured for use, is now cheaply carried to distant points in the interior, and used in regions where houses and fences could scarcely have been built had the materials been brought by the old ways of land carriage. As the supplies of a once timbered region begin to fail, the deficiency is made up from more distant points and equalized according to the demand without much regard to space, and so long as there are regions within reach of railways where materials can be found for supplying the trade, we shall not realize the extent of the exhaustion until we nearly approach the end. If our railroads equalize the supply, they are at the same time equalizing the ruin which will be felt with equal weight in regions once supplied from their local woodlands, and in the prairie regions that had none.

In the older countries of continental Europe, necessity has long since taught prudence in the care of their forests, and conservative measures have been devised and matured, that deserve our careful study, although from the wide differences that exist in the organization of their governments, and in the tenure of property, we cannot apply their systems of administration, however much we may profit from their methods of cultivation and management.

Throughout the United States, and to a large extent in Canada, especially in the Upper Province, the lands have been conveyed to private owners as their absolute property, and without any conditions or reservations whatever as to its cultivation or use. Its owners may clear or plant trees, or any other crop, as they find it for their interest, and with a prevailing public sentiment favouring the undisturbed enjoyment of property by its owners there is not the slightest prospect that a law would ever be passed, or that it could be enforced, for the compulsory reservation or planting of woodlands upon private estates. The owners must see it to their interest and profit to cultivate trees before any plantations are made beyond such as may be undertaken for ornament or for a definite use. If they feel the want of wood for fuel or fencing, or other uses, and find that it can be grown cheaper than it can be purchased, they will plant. In fact, the principle that here applies is the same as in cultivating grain or fruits, with this marked difference, that the planter must wait a longer time for his returns, and of course must have other means of support while his crop is growing. His estate, however, is all the time gaining in value, so that if obliged to sell it he can at any time realize the returns from his investment in value if not in kind.

It would be well if he would forsee this need, and thus escape the realization of the want which improvidence will be sure to bring. It must be the work of education everywhere, if we would awaken the public to a proper understanding of the importance of this subject, and of the duties that each one owes to himself and to the future, in regard to this great question of Forestry which we have assembled to discuss on this occasion.

It is the part of true wisdom to look upon this beautiful earth, as held by us in trust—it is, at best, only a life-lease that a man holds to the estate for which he holds an absolute deed of possession—and it is our solemn duty to so manage this trust as not to dissipate its value, or perhaps render it wholly incapable of restoration.

It is, perhaps, not fully realized how easily we may do an injury to a country which the most costly and painstaking labours can scarcely overcome. In passing up the valley as the railway from the city of Turin leads up to the Mount Cenis Tunnel, the country, at first a perfect garden of fertility, is seen to be encumbered with the *debris* which have been brought down the stream from the mountain sides, in many places covering the alluvial soil with a worthless deposit of gravel and sand. In some places the owners, by gathering this material into great piles that cover half the surface, have managed to plant the remainder; but it is almost a forlorn hope, and at best but a costly and imperfect attempt to recover a part of what would otherwise be wholly lost.

In this instance the injury has been largely caused by the throwing of loose materials into the stream from the roadway along the bank, and from the numerous small tunnels through which the railway passes; but it is also partly due, and in a multitude of cases elsewhere it is wholly due, to the clearing off of the woodlands upon these mountain slopes, and the inconsiderate pasturage of the herbage by which the surface has been exposed to dangerous erosions, and slides of the loose materials into the channel of the stream.

We have here a common and familiar instance of the irreparable injury that is being done everywhere in the clearing off of forests upon steep declivities, and of the damages which one person may do to the property of another without actually entering upon his premises or exposing himself to a charge of trespass within the common meaning of the law.

Without further considering the duty of the private citizen beyond that of planting and protecting trees upon his own land wherever the opportunity offers, let us turn to consider what our Government should do to protect the interests of their citizens in the matter of forest planting and conservation. But before doing this we might stop for a moment to notice what they have neglected to do for the protection of this great interest.

In the beginning, we find in the States, while still British colonies, an occasional indication of a policy which does credit to the men of that day, in reference to the maintenance of forest supplies, and it would have been well had the thought left something more than its record.

In laying down a system of regulations for the guidance of his settlers, William Penn prescribed that a fifth part of the whole area of his province should be reserved in woodlands—a percentage very nearly the same as that demanded by the best approved authorities of the present day. Had this precept been observed, Pennsylvania would ere this have been checked in the destruction of some of the finest and fairest forests in regions where the fruits of early years can no longer be cultivated by reason of bleak exposures and late spring frosts that were unknown when woodlands were more common than now.

In Plymouth Colony, half a century earlier, and eleven years after the first landing of the pilgrims, we find stringent regulations against the setting of forest fires, under penalty of damages for the injury that might be done, and "if any person fire ye woods yt hath noe just cavse so to do, hee shall forfeite to ye countries vse or be whipt."

But perhaps the most interesting traces of the conservative policy of the early period of colonization may be found in the measures proposed in the then French colony of Canada. During the reign of Louis XIV. the grants of land that were being made in Canada were coupled with the condition that pine timber fit for masts of vessels should be reserved from clearing in certain cases, the property therein being retained by the Crown.

It would be an interesting study for a Canadian archæologist to trace up the history of these reservations, with a view of ascertaining how extensively they were made, and how far they were observed.

But in the United States the general government has almost altogether lost its opportunity in the disposal of its national domain. It would have been possible to insert a clause in the patent for every section that it conveyed that a certain portion, if already timbered, should be preserved in woodland, or if a prairie, that a part should be planted within a time and in a manner that would not have been burdensome, and that these conditions should follow the title in all future transfers.

But without dwelling further upon what might have been done that was not, or further noticing the good intentions that failed, let us consider what may still be done under authority of government in providing for the public welfare with respect to forest supplies.

The plan I would suggest as worthy of study for this object would be somewhat as follows :—

Let a system of forest administration be established that should include the means for exploring and estimating the extent and value of timber tracts. Let them be divided and described by natural boundaries into parcels of convenient size, and let a ground rent be fixed that should be reasonable in amount and certain in its terms of payment. Let these parcels be leased one year at a time, but with privileges of renewal at the end of each year upon strict compliance with all the terms of the lease. Let the principal revenue depend upon the amount of timber brought out, and in case of competition for the privilege, let the man have it who will bid the most. Let the terms of the lease reserve the young trees below a given size, and impose strict attention to prevent forest fires. And finally, let the land be reserved and protected for a future growth. Inspections and reports should be required to ensure a knowledge of the fidelity of all parties to the conditions of the law and exactness in the returns, and the business of each year should be embodied in an annual report.

A plan of forest management, having for its object sustained production for indefinite time, implies a special qualification for the service, and both a theoretical and practical acquaintance with all matters affecting the growth and reproduction of woodlands. It needs maps, plans and a programme for future management; the location and construction of roads for the removal of products; the measurement of standing timbers; the calculations of areas and contents, and a wide range of knowledge in the sciences that concern the welfare of forest growth; the prevention of injuries so far as within the skill of man is possible, and a habit of study and observation that qualifies the mind for appreciating and applying any modifications of a plan as new conditions may require, and as unforseen contingencies may arise.

In Europe, where forestry has been practically studied for centuries, Schools of Forestry have been established under the care and at the expense of governments or of associated proprietors of forest estates, for the express purpose of preparing candidates for the forest service, for the intelligent and successful discharge of their duties, and none but those who can bear the test of rigid examinations and of approved practical skill are entrusted with the care of the public forests.

With us there has been hitherto no inducement for young men to qualify themselves for such a position as the superintendent of a forest would be required to fill, and no opportunity would have been open for them had they the requisite qualifications for the trust.

There can be but little doubt, however, but that persons fully qualified for a beginning, could be easily found, and that others would seek to qualify themselves whenever there was a prospect of permanent employment.

But there is another class of duties that relate to the sale of timber and its delivery —to its protection from trespass, and other administrative details that can be performed by any person possessing vigilance, energy, integrity and a good business talent.

It might be proper to assign these general duties to two classes of agents under one central direction, but acting separately, each in matters relating to his own charge, but both in harmony with the general plan. In case of such a division of duties, the one looking after the general welfare of the forest should decide when and where and how a cutting should be made, reference being therein had to the condition of the woodlands, and the welfare of their future. It should have the care of inspection, to insure faithful observance of its rules and conditions in the work done, but he should have no interest nor motive in any way relating to the sales, and in European Forest Codes, not only are the agents in the service excluded from dealing in forest products, but their relatives also, within the limits of probable interest, or the sympathy of family ties.

Already in the British Colonies of Australia, in New Zealand and in India, systems of Forest Management have been commenced in a way that promises good success—but from the necessities of the case, each country has much to learn that could not be applied in another.

Let us next for a moment consider the duties and opportunities of Canada in this great question of National Economy, which, whether we are willing or not, will unavoidably and only too soon be pressed upon our notice. The crown lands here belong to the Provincial Governments, excepting in Manitoba and the North Western Territories, in which they are owned by the Dominion Government.

This plan of management differs somewhat in its details, but in the main is this :— The forest is leased, generally at a certain ground rent per square mile, and for short periods, and a certain rate of tax is collected upon the timber that is taken out. If two lumbermen want the same tract it is put up at auction, and the man who pays the most for the privilege, in addition to the ground rent and the rate tax, obtains it; but generally the man who has made improvements, and has complied with the terms of his lease, is allowed to renew it from year to year until the timber is all removed. The soil itself is retained by the Government, and after a lapse of time it may again come into market for the sale of another crop.

We may congratulate the Canadians in having already, and, perhaps, inadvertently made a long advance in the way of forest management, which, with amendment, may gradually be brought into a very complete system. In the Province of Quebec the pine trees under twelve inches in diameter are reserved from cutting. It would be better to rescue them of larger size, because a pine of that size is gaining more rapidly than at any other period, and it is a sacrifice of interest to cut it of that size.

This is good as far as it goes ; let me suggest some further regulations tending to profitable returns and to future supplies. Let the wood-lands where the timber has been cut be carefully protected against fires, against pasturage, and against plunder. It would require a system of forest wardens, or guards, and would require some outlay, but the investment would, in the end, prove profitable in the result.

Let there be introduced at first, in your agricultural schools and your colleges, instruction in Sylviculture ; and at the first, and till something better could be provided, let each graduating class have the opportunity of hearing at least a few lectures upon the first principles of forest management and of tree planting—and the profits that result from judicious planting upon private estates.

With a proper study of the methods by which the public timber lands should be managed, I am convinced that a judicious and practical system could be devised for bringing these lands up to the standard of greatest possible production, and that it could be sustained for a long period of time.

But aside from this management of public woodlands by the Government, there are other, and vastly greater objects to be attained, in the way of planting, by the owners of land. We have already noticed the fact that throughout all the older States of the American Union, and in most of the settled portions of the newer States and the Territories, as well as in the settled portions of Canada, the title to the lands has been passed to private owners, without reservation as to their cultivation or their clearing, and that neither a general nor a local government can interfere in their management, so long as they do no injury to the public.

It is these owners of lands that must do all the planting ever done upon them—at least from our present stand-point we can foresee no prospect that any such improvement would be undertaken at the public cost, or by compulsion of law.

But men do not incur expenses unless they can expect returns, either in advanced values, or in saleable products, and they must be made to realize that money is to be gained or saved, before they will be willing to incur expense.

It is the main business of Forestry to teach how this can best be done in tree planting, in places best suited for their growth, it implies a knowledge of the climatic conditions, of the capabilities of the soil, the requirements of particular species, and the best methods of management.

In undertaking this cultivation, it is of the first importance that we should understand, not only the limits of possible endurance, but especially those within which we may secure the most favorable growth. In a region that was covered with timber when its settlement began, we have generally an evidence of what might be secured by plant-

ing, in the remnants of the native growth still remaining, or in the plantations that may have been formed for ornamental purposes or other use.

Dr. Hough concluded his address by recommending experimental cultivations with the view to ascertaining what varieties of forest trees are best adapted to different sections, especially in the prairie regions.

Mr. D. W. Beadle, of St. Catharines, one of your delegation, was next called upon to speak, but owing to the late hour, it being then after ten o'clock, contented himself with moving the adjournment of the meeting, saying that he would improve some other opportunity of addressing the citizens on the subject of Forestry.

Tuesday, August 22nd.

There was a large attendance at this, the second day's proceedings of the Forestry Congress. Among the distinguished representatives of Forestry from theUnited States were the Hon. George B. Loring, United States Commissioner of Agriculture, and President of the Congress ; Dr. John, a Warder of North Bend, Ohio ; Dr. Chas. A. Mohr, of Mobile, Alabama ; Prof. Franklin B. Hough, Chief of the Bureau of Forestry in the Department of Agriculture, Washington ; B. E. Fernow, of Slatington, Pa.; J. W. Manning, of Reading, Mass.; J. H. Hicks, of Roslyn, N. Y.; Byron D. Halsted, of New York City, and General Eaton, Commissioner of Education for the United States.

The Hon. George B. Loring, President of the Congress, took the chair and addressed the meeting as follows :

He had come here with considerable difficulty, and in the midst of a great deal of hard work of a certain kind, not because he was officially connected with the Congress, but because of the high estimation in which he held the object for which they were met together—the object of preserving, protecting and restoring the forests of this country (by this country he meant Canada and the United States, and as far south of the States as any ambitious gentleman was desirous of going), and of indicating to the world as far as they could what was the value of the great forest growth of this Province. Another reason for his coming here was that he was glad to know that there was one pursuit in which Canada and the United States had a common interest, and on which they can in no way be divided. It was a good thing to join all our nationalities in one common interest, at any rate. For a long time the question of Forestry had been so to speak æsthetic, but it had been followed up so persistently that trees had reached the position which they had a right to claim. Every man knew how to adorn his farm ; in fact our ancestors, 200 years ago, built up what might almost be termed forests round their farms, which were standing to-day as an example of American industry, American taste and American determination to make the American home what it should be for the intelligent man, woman or child. What he meant by America was not only the United States, but the whole North American Continent, with a total disregard for political differences, and a total disregard for social, civil and religious differences. He had begun on his own farm 25 years ago and planted evergreens and other trees, adorning a bleak hill, in order that he might have a nice home, and he grew just as familiar with the peculiarties of these trees as he was with his Ayrshires, his Black Hawks or his Merino sheep. He had been particularly unfortunate with his Black Hawks, not one out of 500 was a trotter, and he could not keep sheep in a State where boys would shoot everything else except another boy, and that accidentally. After an absence from that farm for three years, he still remembered the evergreens, the spruce, the hemlock and the white pine—the noblest tree grown on this great North American Continent—and other trees that were upon it. The student of Forestry is really a botanist, because he feels the same interest in a tree that a botanist feels in a rare plant. We have been shown, not only the habits of trees, but their origin and their peculiarities, and also the climate and soil to which each is adapted. We owe our knowledge in this direction to such scientific investigators as Michaud, George B. Emerson, and others. The scientific part of this matter had been thoroughly discussed, and there was not a man in the room interested in Forestry who did not know where to go to get the peculiarities of any tree which he desires to cultivate.

We are greatly indebted, therefore, to the scientists who have spent so much time in investigating this subject. All thanks to the Scientists who told us where the pine tree and the walnut tree would best grow, where we could most profitably plant the maple, the birch and the willow, and where the eucalyptus and the catalpa would best grow and do the most good. To these men, therefore, who have laid the foundation of this great work that we are just entering upon, all honor and praise are due. He expressed astonishment at the timber wealth of Canada. He said they had done well in having a paper read to them by a practical lumberman, giving a practical view of the great timber wealth of this country, and also some practical hints as to how this great wealth could be preserved. There were great wheat fields in the North-West; he had visited the great cotton plantations of the South, and the great cattle ranches of the West. But alongside of wheat and cotton and cattle there stood in the forests of this country a greater mine of wealth than the wealth of cotton, wheat and cattle combined. Why had this great mine of wealth been forgotten? The great trouble had been hitherto that every man had felt that he had a perfect right to go on to Government lands and cut his own wood and do as he pleased with the lumber thereon. The law of possession had not been as strictly applied to them as it had to agricultural lands. This was a great mistake; we must bring the public forest lands under the supervision of law as closely as are the farms of individuals. The invasion of timber lands or forests was just as much an invasion as was the trespass upon private property. The value of the lumber industry in Canada had been referred to, but he would tell them, as he told an audience at a meeting in Massachusetts some time ago that the products of the lumber industry alone in the United States annually amounted to $250,000,000. It had grown to enormous proportions. There were other industries which had grown wonderfully too. The product of the leather trade in the United States to-day amounts to $150,000,000 annually, and when he told the merchants and manufacturers of Massachusetts that that industry had grown up within his time they were perfectly astonished. But he could remember when it took a peripatetic cobbler one week to make him a pair of boots and it took him three years to grow out of them. Now a man could, with the machinery of Lynn manufacture 1,200 pairs of shoes a day. The silk industry had also increased within the last ten years from an annual product of $10,000,000 up to more than $35,000,000, and the American silk to-day found a ready sale, although many ladies thought that the sheen of the French silk was a little better than the American. The United States learned to take care of her silk industry just as England did after the Anglo-French treaty had expired. The lumber industry in the United States amounted to $233,000,000 annually, and the number of persons employed in it was about 141,000 besides about 500 children and 2,000 or 3,000 women, enough to make a very respectable sized city. The amount of money paid in wages to these persons for the support of their families and the education of their children was nearly $36,000,000 a year. Was he wrong then, in claiming that the foundation of this industry should be as sacredly protected by law as the cotton, the boot and shoe, or any other industry? The question had passed out of the sphere of individual tree planting for ornamentation, had passed out of the sphere of scientific investigation, and they were engaged to-day in developing, preserving and protecting our forests, among other things, in the interest of our lumber industry, one of the three great fundamental industries of this world. This industry was certainly entitled to some consideration, and the question naturally arises what consideration was it to receive? In the United States, as they all know, there was a great variety of Governments, why they had more than 15,000 law makers in the United States, and they managed to get out of them a pretty good lot of laws. They had their Congress and Legislatures and Municipal organizations, all engaged in making laws, statutes and ordinances, and they could find, if they were to number them, that there were nearly 15,000 of them engaged profitably at it.

He said it was pretty hard to tell what was to be done. The Federal Government had no right to go into any of the States, but it had special privileges, and could set the different States a good example, at any rate. One thing they wished to know, was how to protect the forests from the settlers themselves, who look upon a pine tree three or four feet thick with profound contempt, but who regarded a stalk of wheat a sixteenth

of an inch thick with the most profound respect. He did not know what they did in Canada, but he thought none of those lands which are unfit for the cultivation of anything else except trees should be occupied, and the Government should protect them just as well as they protect the most valuable agricultural lands. Let the Government declare, that all forest lands unfit for cultivation shall remain the property of the Government, who shall derive only such a revenue from them as shall not exhaust them. Then with regard to forest fires. He had studied the matter with great care, and the first thing we should do is to create a right of forest lands, and then infuse such an inpouring of opinion, that the settler will understand the value of forests, and understand that bush heaps or dead grass should be properly cleared up before setting fire to. It was only the other day that a man in one of the Eastern States with a farm valued at $60,000 or $70,000, and with a house upon it fully equal to an English manor-house, had it nearly destroyed by fire. Two little boys started the fire in fun and swam across the stream to get out of the way, and if it had not been for the courage and energy displayed by that man's wife, his place would have been completely destroyed. Yet, this was what settlers were doing every day, but, let him understand that a piece of land that is burnt over is more than half killed, and he will be more careful and preserve it. Nature was always restoring forests, and would do her share of the work if we would give her an opportunity. He had seen abandoned farms in the Eastern States which were growing up fine trees, and these would render them more valuable than they were before. From the official reports of the department at Washington, he took the following statement, showing the number of feet of pine at present in the undermentioned States, and the number of years it would last, at the rate they were now cutting it :—

STATE.	Number of feet of pine.	No. of years.
Texas	21,508,000,000	300
Florida	6,615,000,000	30
Alabama	18,885,000,000	70
Mississippi	17,200,000,000	150
Minnesota	6,100,000,000	10
Michigan	29,000,000,000	7
Wisconsin	41,000,000,000	20
North Carolina	5,229,000,000	50
Louisiana	48,213,000,000	540
Georgia	16,778,000,000	75
Pennsylvania pine	1,800,000,000	5
" hemlock	4,500,000,000	15
Arkansas	41,325,000,000	320
California	25,825,000,000	100
South Carolina	3,316,000,000	27
Maine, pine and spruce	5,000,000,000	16

New Hampshire does not return a pine tree of any kind, but returned 1,500,000,000 feet of black spruce, which will all be gone in ten years at the present rate of cutting.

This shows what we can rely upon in this section of the country, and, hence it was evident, that in about one generation the supply of timber in the United States would be almost completely exhausted unless means were taken to protect it, and prevent the present frightful waste.

At the close of President Loring's address, Mr. B. E. Fernow, of Slatington, Pennsylvania, asked whether the special Committee appointed at the Meeting in Cincinnati to consider the subject of

FOREST FIRES

was prepared to report.

DR. CHARLES MOHR said, that, in absence of the Chairman of the Committee, he had himself prepared a report on forest fires, and the injuries caused to the forests by inroads of cattle, which he would read.

The following is an abstract of his report so far as the points considered bear upon the conditions affecting the forests of Canada :—

I find myself not prepared to present a formal report, the result of joint deliberations, but venture to lay before the meeting simply a statement of the facts arrived at by the limited inquiries and observations made in regard to it in the great lumbering districts of the pine regions. Of these, like other forests regions, it can be said, that the fires raging season after season through their forest have caused a greater and more irreparable destruction, inflicting a deeper harm than all the devastation brought about by the combined lumber industries of the past and the present day. The practice of setting fire to the woods existed among the Indians before the arrival of the whites. The white settler to meet the necessities of his existence, had to spend the energies of his life in the destruction of its forest growth, engendering a habit of destruction and a disregard for the forest, which, under vastly altered circumstances still comes into active play, leading to a needless devastation and neglect of the preservation of the forest, detrimental to private interests as well as to the public wefare. Many of the forest fires are the consequence of carelessness, neglect, and utter indifference to their consequences, as frequently they are wilfully started to serve some purpose.

The first effect of these fires is the total destruction of the pine seedlings, which, together with the younger growth, are not strong enough to resist the effect of the scorching to which they were exposed.

Another effect leading pecuniarly to enormous losses, is the arrest of the growth in the trees exposed to these conflagrations. This is most remarkable, and no doubt due to the injurious effects of the heat.

Another most pernicious effect resulting from the recurring fires is the total destruction of every particle of organic matter in the surface soil, reducing it to a state of arid, barren sand of absolute sterility. All efforts of single individuals are of no avail in abating this crying evil, they must be persisted in by the community, and it is only by judicious legislation that its correction can be reached.

INJURIES BY CATTLE.

The injuries resulting to the forest from the inroads of live stock are, direct and indirect, scarcely less detrimental to its preservation than those sustained by fire. The unrestricted pasturing of cattle leads more slowly, but not less surely, to its final destruction. The direct injuries result from the browsing and eating of the tender plants in their youngest state, and of the young shoots ; the tearing, breaking, and tramping down of the small growth, leading to its mutilation and premature decay, or to their being killed outright ; in short, to the impossibility of the rejuvenation of the forest by its natural seeding. In the pine lands these injuries are less apparent, and less fatal to the progeny of the pine, the young trees being not eaten by stock, and the chief injuries to them result from tramping. The running at large of live stock is indirectly injurious to the forests by reason of the enormous draft upon its resources of timber to build fences for the protection of the crops from the cattle. The enormous sacrifices of timber and labour required in the fencing of tilled lands are a great drawback to the tiller of the soil, which

makes itself in the older settled and more densely populated districts severely felt, and the necessity of the abolition of the old ways has led in several of the States to the adoption of a stocklaw, general or optional with the various sections of the State. In South Carolina the stocklaw was first optional with the counties, and after a short while its benefits became so apparent that it was applied to the whole State. The violent opposition with which it was met by the poorer population of the low country has gradually disappeared, the people becoming reconciled by its benefits, and its introduction is to be regarded as a great impetus to the prosperity of the farming community.

The reading of this report was followed by a very interesting discussion on the subject of forest fires. Mr. Peter White, M.P., of Pembroke, said he had given the question close attention for over ten years, especially as affecting the Upper Ottawa region, where he had no hesitation in saying quite as much timber was swept away by fire as fell beneath the blows of the lumberman's axe. What the latter cleared might be put at between twenty and thirty millions, while that destroyed by fire at certainly not less. His own conviction was that the greater part of the waste was attributable to the carelessness of the sportsman and fisherman, and a very small portion of it only to those engaged in lumbering. New settlers were also responsible for a good deal of the mischief. He did not doubt that the employees of lumbering firms were not always free from blame, but it was absolutely to the interest of their employers to take every possible precaution to save the wood in their limits. What could be done better to prevent this loss of valuable property from this cause? He understood that while in Quebec the burning of refuse on timber limits in July and August was prohibited, in Ontario the time of restriction was between April and November. Experience showed that the forest fires along the Upper Ottawa occur between May and August, those months inclusive, and his suggestion was to prohibit the starting of fires for clearing or other purposes within those four months. He would also suggest the division of the timber lands into districts, each under the guardianship of a policeman resident within it; one duty of such functionary being to visit every settler towards the close of winter, say some time in March, to give him all necessary information and caution as to the requirements of the law in regard to this matter. He believed there was very little incendiarism in the lumbering regions, and that the bulk of the fires that occurred originated in ignorance and carelessness. Officials, such as he had suggested, ought to keep a careful watch at all the principal avenues of districts liable to be laid waste by fire. He thought that the estimate offered of the loss by this cause, as compared with the product the lumbermen secured, was far too moderate; he believed it would be nearer the mark to say it was ten to one, than to represent the two as approximately equal. As to precaution it might be urged that as the lumbermen had so large an interest at stake, they might be looked to to provide the necessary precautions. That was true in a sense, and he had no doubt that those concerned would willingly submit to the imposition of a small tax, if necessary, for the purpose of securing the required protection. The firm with which he himself was associated had for years looked after their own interests in this matter, but it was obvious to every one that it was out of the power of private individuals or business firms to act with the authority and force which the Government could command.

Mr. Wright, Mass., related his experience of the ravages of fire in the vicinity of Duluth. His recommendation was that the *debris* which attended lumbering should be cleared away, or at any rate not let lay scattered but piled up in considerable heaps. He did not believe that lumbermen set fire to the forests; they knew better than to do that, but there was a certain amount of carelessness which worked a good deal of harm.

The Hon. George Bryson, Coulonge, said: "For the last few years the majority of fires in his district had occurred in May and June, and in September and October, and much good might attend the adoption of the suggestion to appoint officials for patrol duty through lumbering districts during these months." He agreed with what had been said as to the estimate of value taken out and value destroyed being glaringly inaccurate. Years ago he had stated before a committee of the House that the proportion of the latter to the former was fully ten to one.

Mr. John Dougall, of New York, said the month of May was the first month in the year for forest fires, owing to the fact that at that time the ground was covered with

dead leaves and grass as dry as tinder, which took fire from a spark. Hence the month should be included in the time during which settlers should be forbidden to burn bush.

Mr. THISTLE, Ottawa, speaking as a lumberman of fifteen years standing, and also as a land surveyor, referred to the difficulty of disposing of the *debris*, owing to the circumstances under which lumbering operations are carried on in this country—the extent of the limits, the widely scattered shanties, &c. He was favorable to the idea of inducing Governments to co-operate with the lumbermen by the appointment of police for this special duty, who would act conjointly with their own men. The speaker went on to give a graphic description of the burnt lands of the Upper Ottawa and to the north of that region, and concluded by remarking that there was no doubt in his own mind that ten times as much lumber was burned as was cut.

Mr. WRIGHT suggested that it might be well to consider whether it would be possible and profitable to convert the lumber refuse into potash or charcoal or convert it to use in some other way.

Mr. J. R. MARTIN, Cayuga, said it was an undoubted fact that many forest fires were started by shantymen to make work for themselves when things were getting slack. The idea of appointing policemen to patrol the forest lands was a good one; every constable so acting would be at once a conservator of the trees and of the peace. He had heard of gangs being systematically formed in Wisconsin and Michigan for the pnrpose of firing the woods. He regarded favorably the suggestion, if practicable, of converting the lumbering *debris* to use.

Mr. WARD confirmed what has been said as to the wanton destruction of valuable forest trees—the yellow birch for instance which was sometimes set on fire for the very pleasure of seeing its instantaneous and brilliant blaze. There should be a heavy punishment inflicted in the case of every conviction of such atrocious conduct.

The Chairman, in a few words, expressed his satisfaction at the practical tone of the discussion, and his opinion that there should be provision made for the severe punishment of men who would destroy a forest but not think of burning a barn.

HON. Mr. JOLY moved—That it is the duty of this Congress to draw the attention of Governments to the necessity of better precautions against forest fires. He thought respectful representations on the subject would receive due attention from the Governments of the United States and Canada.

Mr. Joly's motion was carried, and, on motion, it was resolved that the Committee should consist of Mr. P. White, M.P., Mr. J. K. Ward, Dr. Mohr, Hon. Mr. Bryson, Dr. Hough, Mr. B. C. Fernow, Hon. Mr. Joly, Mr. William Little, Mr. Charles H. Sargent and Mr. E. D. Baker.

The remainder of the day was taken up with the reading of papers, many of them of very great value, to which fuller reference will be made in a subsequent part of our report.

The evening session was of a more popular character. It was held in the Queen's Hall, and was well attended by a large gathering of ladies and gentlemen. The Hon. Mr. Joly introduced the Hon. Gen. Eaton, Commissioner of Education for the United States, who had kindly consented to address the meeting.

Hon. Gen. Eaton said that, having had opportunity to observe most of the forests in the United States, he was able to appreciate the importance of this meeting. But he was here in his capacity of education. Forestry was a subject on which the general public must first be informed before they can take the remedial measures called for by the needs of our forests. Man should not be the enemy of the tree when God had placed them side by side to react upon each other for man's better health and greater happiness. The tree was man's friend, and he should be so taught to consider it. We must have text-books for the schools and scientific magazines, to set forth the importance of forestry. Since Dr. Hough had been appointed a commissioner to investigate the whole subject on this continent and in Europe, a great advance had been made in the education of the public mind. What was specially needed now was a scientific journal such as was projected by Dr. Hough. A text-book had already been prepared, and it was desired to introduce the subject into the two hundred normal schools of the United States, that thence the knowledge might descend to the children that God made the tree, and that it was their friend.

The Hon. Geo. B. Loring having come in, took the chair, and addressed the meeting at some length, in general terms, upon the importance of forestry to the American and Canadian peoples and its bearing upon the interests of agriculture, the great industry of both countries.

Mr. Joly said Canadians ought to be grateful to our American friends for holding their Congress in this city. He must confess that the address of the Hon. Mr. Loring had completely dispelled any false notions he had hitherto entertained concerning our American neighbours. We were accustomed to look upon them as a people devoted to the pursuit of the almighty dollar, but we had just had abundant evidence that in no country was the worship and love of nature, of country and of home more general and more intense than among our American friends. We could grasp them by the hand and rejoice to labour with them in the promotion of the interests of forestry and kindred objects. Although not a citizen of Montreal, the people of this city had deputed him to speak in their name, and in this capacity he now bid our American friends God speed, and thanking them again for their visit, hoped to see them often hereafter on the same noble, patriotic and humanitarian errand.

The meeting then dispersed.

August 23d.

The Forestry Congress met at their rooms on St. James' Street at half-past nine o'clock, the Hon. Mr. Joly in the chair.

Preventing Forest Fires.

The Hon. Mr. Bryson presented the report of the Committee appointed to memorialize the Government with reference to preventing forest fires. The report recommended, first, the reservation of all pine and spruce lands, unfit for settlement, for lumbering purposes exclusively; second, prohibition of the burning of brush by settlers in the vicinity of fir trees during the months of May, June, September and October; third, the division of the timber country into districts, and the appointment of police under a superintendent with magisterial powers, whose duty it shall be to detect and punish offenders, and provide for the extinguishment of fires; fourth, the cost of maintenance of this protective force might partially be met by the imposition of a moderate tax on the parties owning or leasing timber lands.

The report was adopted.

Election of Officers.

The Congress then proceeded to the election of officers, as follows:—Hon. Mr. Loring, President; Hon. H. G. Joly, 1st Vice-President; Dr. J. A. Warder, 2nd Vice-President; W. S. Little, Montreal, Secretary; John S. Fay, Massachusetts, Treasurer.

Prof. Hough suggested St. Paul as the place of next meeting of Congress. It was generally thought desirable to have the meeting at or about the same time and place as the American Association for the Advancement of Science, and it was the general opinion that its next meeting would be in Minneapolis, Minnesota.

It was resolved that the fixing of time and place of next meeting be left to the Executive Committee.

Mr. Hicks moved that the Executive Committee appoint referees to prepare papers on legislation with regard to forest fires, prevention and control of forest fires, distribution, technology and forest management of the white pine.

The motion was carried.

Votes of Thanks.

Votes of thanks were then tendered to the Governments of Ontario and Quebec for the interest taken by them in sending delegates to the Congress; to the Mayor of Montreal and citizens generally for the interest taken by them on this occasion; to the press for

reporting proceedings and papers; to the various railway, steamboat and telegraph companies who have afforded facilities to gentlemen attending this Congress.

Dr. Warder moved that the thanks of the Congress are to the Geological Survey, Ottawa, for a set of reports; to the Commissioner of Crown Lands of the Province of Quebec, for specimens of Canadian woods; to the Hon. Mr. Joly for presiding at the meetings; to the citizens of Ottawa for their invitation to visit that city; to the American Association for the Advancement of Science for an invitation to accompany them to Quebec; to the ladies of America for their interest and assistance in the promotion of forestry; to the Montreal Amateur Athletic Association for an invitation to use their library; to gentlemen who have sent valuable papers to the Congress; to Mr. James Little, Montreal, the Nestor of American Forestry, for his long continued efforts on behalf of American Forestry.

Motion agreed to.

This closed the Sessions of the American Forestry Congress in Montreal.

Respectfully submitted,

D. W. Beadle.
Wm. Saunders.
P. C. Dempsey.
Thos. Beall.

GENERAL REPORT ON FORESTRY.

Your several committees, having submitted such particulars as we deem of interest in connection with the recent meetings of the Forestry Congress in Cincinnati and Montreal, propose now to take up in a fuller manner the important subject of Forestry and dwell at greater length on the more practical points connected with this momentous subject as developed and presented in the valuable papers read at the meetings referred to.

It is essential at the outset, to show as far as practicable, the present actual condition of the forests of Ontario, where they are chiefly located and the proportion they bear to the arable land of the Province—a paper read by Prof. Brown at the Forestry Congress in Cincinnati, entitled "Forest and Rainfall in Ontario," contains so much useful information upon this subject as well as upon others, which will be touched upon hereafter, that we present it entire:—

FOREST AND RAINFALL IN ONTARIO.

The first time I had to do with any purely scientific view of trees and climate was in 1867, when I secured the practical recognition of Arboriculture as a science, before the "British Association for the Advancement of Science," when also, with two others, we obtained a sum of money to begin experiments in order to ascertain the real or supposed influence of trees upon rainfall. A very great deal has been said and written on this subject since, yet I am not aware of much that is new, or any clear light through exact reported facts on the American continent, where, of course, conditions are very different, and must be sought for independently of any others throughout the world. We cannot take European conclusions and use them here with any measure of trust, because physical conditions are just the extreme, so to speak, of those averaging in the eastern hemisphere. Hence the necessity of independent experimental action—should experimental work be thought of any value.

From 1855 to 1869 my profession gave me the direct superintendence of planting 21,000,000 trees on two extensive estates in Scotland, along with the regular thinning and clearing of woods according to the system laid down in the work called *The Forester*, of

which my father is author. I mention this principally to show that the aims of this Association ought to have my support, and that the subject of conserving and re-planting in America comes home very warmly.

It needs but a glance at the map of North America to feel that such an immense body of land must possess physical conditions that have both the working and the regulation of its own climate. The older part of Ontario, wedging west as it does into the States, and bounded south and west by great bodies of water is a very peculiar portion of this great block of land under discussion; it is indeed perfectly unique, and hence I beg the particular attention of the convention to some phazes of its forest and rainfall.

I submit first, that there are five active over-ruling agents in the construction of climate thus far inland on a large continent

1. Geographical position.
2. Configuration of surface—such as altitude.
3. Large bodies of water.
4. Vegetation.
5. Storms from distances.

What, and how much, each does, is not evident, and maybe never will be ascertained.

On the accompanying map I have drafted and indicated some facts with reference to proportions of forest still existing and with reference to the average annual rainfall throughout Ontario proper. From Detroit to Quebec Province boundary is about 500 miles, and from Lake Ontario to Lake Nipissing, 200 miles. The configuration of this triangle is pretty uniform as regards non-possession of any mountains or prairie, but with a marked table land, as shown, immediately south of Lake Huron, nearly butting on the lake fifty miles broad and running south-east for one hundred miles—two-thirds of the distance to Lake Erie. This high land averages 800 feet above Lake Ontario and 500 above Huron. The fine parallel lines represent where over 50 per cent. of the original forest still remains, and the broad stripes where less than 50 per cent. exists. Rainfall from thirty-five to forty inches per annum is shown by the chequered lines; the dotting indicates where less than thirty inches fall, and the remainder of the land receives from thirty to thirty-five inches of rain and snow per annum on an average. The path, or direction of the great storms having their origin *outside* of the Province, and which bring rain, is indicated by the long arrow which has a bearing of N. 65° E.

It appears, therefore, that two-thirds of Ontario is still in possession of from 50 to 75 per cent. of her natural forest, and, let me add, none of it has less than 20 per cent., so that possibly about *one-half over the whole*, still stands.

Now, with all these data on hand, allow me to ask some questions—knowing it is easier to ask than to answer questions :—

(1.) How is it that so little rain falls on the 75 miles of highly wooded neck of land between Lakes Erie and Huron along the River St. Clair?

(2.) Why, immediately thereafter, does heavy rainfall occur all along the shore of Lakes Erie and Ontario up to and a little past Toronto, where tree surface is least?

(3.) Why is rainfall heavy over most of the table land formerly referred to, the greater part of which is well wooded?

(4.) Why is rainfall so small between Lake Ontario and Georgian Bay, over a district embracing Lake Simcoe—part well covered with trees and part having the least proportion?

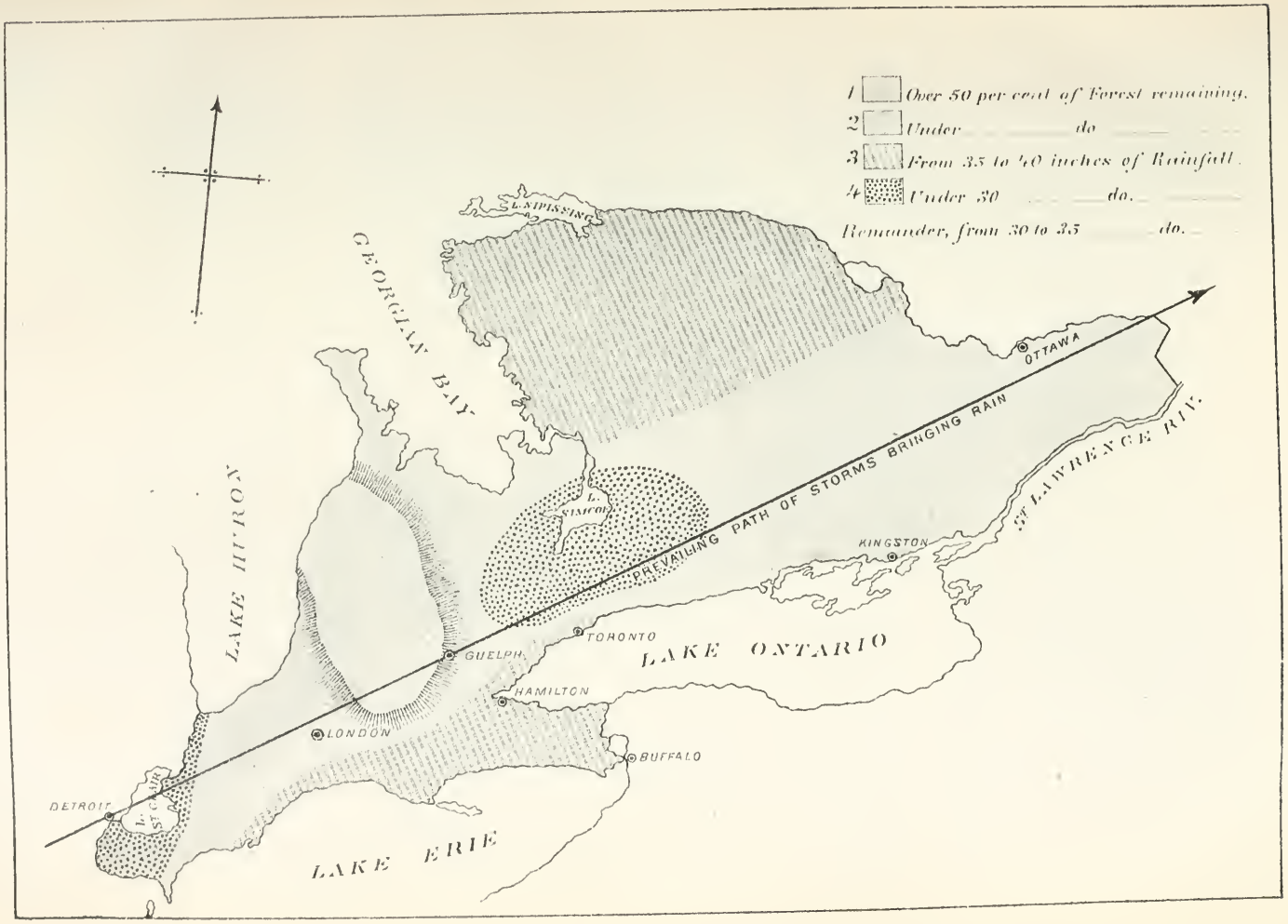
(5.) Why are all the backwoods north to Lake Nipissing in annual receipt of heavy rain?

(6.) Why is there no heavy annual rainfall on the lake shore or midland counties, east of Toronto?

Permit the following solution :—

(1.) Lakes Erie and Huron are stronger attractions for moisture than a river, small ake and a comparatively flat belt of heavy wooded country. Even an outside storm will be drawn south or north of Detroit by these large bodies of water.

(2.) The well-watered north shore of Lakes Erie and Ontario as far as Toronto, is clearly large lake influence.


1 Over 50 per cent of Forest remaining.
2 Under do
3 From 35 to 40 inches of Rainfall.
4 Under 30 do.
Remainder, from 30 to 35 do.
LAKE HURON
GEORGIAN BAY
L. NIPISSING
L. SIMCOE
PREVAILING PATH OF STORMS BRINGING RAIN
OTTAWA
KINGSTON
ST LAWRENCE RIV.
TORONTO
GUELPH
LAKE ONTARIO
HAMILTON
LONDON
BUFFALO
DETROIT
R. ST CLAIR
LAKE ERIE

(3.) Three things go to make the heavy rainfall on the table land: altitude, lake contiguity, and tree surface.

(4.) The fourth question is not so evident: The district of low rainfall is partly on the water-shed, and therefore not low lying. Locally otherwise it has a variety of attractive power, and all around rainfall is more plentiful with similar agencies. I am inclined to ascribe this peculiar feature of Ontario rainfall to the agency of the table land, both locally and in breaking outside storms. Take the arrow as a centre path of outside storms that bring rain with them; if it strikes south of Detroit, Lake Erie appropriates it; if north of Detroit the storm is drawn both by Lake Huron and the table land, is sucked into the Georgian Bay and thus clears Lake Simcoe district.

The fifth question requires no answer other than that of a comparatively unbroken forest, attracting more rain with additions from outside storms through Georgian Bay as just indicated.

I cannot see how all north of Lake Ontario and St. Lawrence River there is only a moderate rainfall, considering the size of the lake and the large proportion of heavily timbered country adjoining.

I have thus endeavoured to show some of the physical conditions of our Province, and their intimate connection with tree surface. Of course I do not presume to pronounce decidedly any conclusions on such an open field of our profession, yet it needs no deep scientist to see that trees have a very great deal to do with the climate of a country, so that, in pressing the claims of this Association upon any of our Legislatures and countrymen, facts are not wanting.

It is gratifying to learn from the foregoing paper that in two-thirds of the Province of Ontario from fifty to seventy-five per cent. of the natural forest is still standing, and that in none of it is there less than twenty per cent., and that, taking the Province as a whole, there is probably one-half of the natural forest yet remaining. It is then not too late to adopt a system of forest management which shall secure this source of wealth in perpetuity, by preventing reckless cutting, guarding against losses by fires and the trampling and browsing of cattle, and by encouraging the planting of trees where such planting would be profitable.

The rate at which our forests are being consumed for lumber may be approximately gathered from the following paper, read at the Montreal meeting, by Mr. G. L. Marler, of Montreal, who said that he had an experience of twenty years on the south side of the St. Lawrence, and might, therefore, speak with some authority on the subject of his paper.

THE DENUDATION OF OUR FORESTS.

The subject of this paper—The Denudation of our Forest Trees—has been one which has often presented itself to my mind, and I shall lay before this meeting the most salient points, and endeavour to be brief in my remarks, but at the same time bring before you the most important points.

The Province of Quebec is the principal territory from whence the mercantile lumber is drawn. When I say mercantile lumber I speak of those trees which make up the lumber trade, and are taken from the following lists:—

1st Division—Canadian Trees, Leaf-Bearing.

Quercus	Oak
Ulmus campestris	Elm
Fraxinus	Ash
Betula	Birch
Juglans	Walnut
Juglans cinerea	Butternut

Carya	Hickory
Sideroxylon	Ironwood
Acer	Maple
Tilia Americana	Basswood
Betula	White Birch
Fagus	Beech
Populus	Poplar
Cerasus	Cherry
Balsamodendron	Balm of Gilead
Acer pseudo-platanus	Plain tree
Salix	Willow

2nd Division—Evergreens.

Pinus strobus	Pine
Picea	Spruce
Larix	Larch
Cedrus	Cedar
Picea balsamifera	Balsam
Tsuga	Hemlock

There are two large belts of timber land in the Province of Quebec, one on the south side of the St. Lawrence, the other and greater on the north side.

The first extending from Gaspé to the Bay des Chaleurs, which divides it from New Brunswick, thence along the highlands on the boundary line until it strikes the head waters of the Connecticut river, thence along the line of 45 degrees of North Latitude to the St. Lawrence, by which it is bounded in front. This belt consists of about 30,000 square miles.

The other from below the Saguenay to the Ottawa and thence 200 miles north of the St. Lawrence, and consists of about 120,000 square miles.

Until a few years back these great belts of timber land were reached only by the streams running through them, and could only be devastated by the lumberman a few miles each side of these rivers, leaving large spaces untouched by the woodman's axe. But since twenty years this great belt has been intersected by some dozen railroads, cutting up the land like a checker board, and by this means we must look forward that by another ten years this belt will be entirely denuded of all kinds of timber.

The Northern belt is now passing into the same phase as the sister belt—the rivers on the north side are not so numerous as on the south side of the St. Lawrence, but they are of more magnitude and extend further into the interior—and, like the other belt, is now being also cut across by railways. If we open the Government statistics book we find that the gross returns of the forests for the year 1881 amounts to the neat little sum of $24,802,064, and, as compared with the total exports of the Dominion of Canada, is equal to one-fourth of the total amount, $92,000,826.

In the returns of the Government for the year 1871, the exports for timber were $22,872,591.

Now comparing the year 1881 with the year 1871 there is an increase of $2,000,000.

I have found that in 1871 the cut of timber, as reported to the Government, was:—

	Feet.	Feet.
White pine	24,236,821	26,191,192
Red pine	1,954,371	
Oak	3,302,043	
Tamarac	5,695,963	
Birch	1,939,357	
Elm	1,832,624	
Walnut	117,589	220,570
Butternut	102,981	
Hickory	197,827	

Other kinds	26,290,264
Pine logs	12,416,408
Other logs	9,314,557
Masts	121,685 Feet.
Staves	34,706 M.
Lath wood	25,706 Cords.
Tan-bark	162,521 Cords.
Firewood	8,713,083 Cords.

Now, reducing these several quantities to trees, we have an aggregate of 22,271,384 trees.

If you say 50 trees to the acre, we have a total of acres denuded in one year of 445,428 acres—equal to three townships.

Now there has expired since this return was made 10 years, which gives no less than 30 townships—equal to 3,240 square miles, or three whole counties, supposing each county to consist of ten townships.

Having ascertained the total amount of merchantable or exportable timber, we must not forget the home consumption, which exceeds that exported.

Now what have we done in the way of preservation, very little indeed.

(1) The Quebec Legislature, by an Act of 1882, Chap. XIII, offers a bonus of $12 per acre to any one who will plant an acre of ground with trees, and keep it well preserved.

(2) They have passed an Act, 1882, Chap. XI, "no person shall burn or set fire to any timber for the purpose of clearing land, from 1st July to 1st Sept." The Government, in making their yearly estimates, generally say, amongst the items of revenue, that they will get so and so from forests. Now, when they make or prepare their estimates, they should carefully ponder on this item. Because it is not an annual revenue, it is absolutely taken from capital, which capital is being so rapidly reduced that ere many years the balance must be considered as *nil*, they are killing the goose that is laying the golden egg, in fact they have nearly reached the backbone.

I have now to stop and consider our present position, and ask what must be done for the salvation of our trees—is there any means to replace some of the millions of trees that are cut down annually? I reply in the affirmative; everyone has the power and capacity in aiding in this great work. Does not every tree bear its own seed? and sowing or planting seed is no harder than sowing grain; in so doing you reproduce their kind, and you alter even the temperature of the country; you draw down moisture from the clouds, the trees throw out a certain quantity of carbon, and by the vicinity of trees the health of the surrounding country is benefited in a very large degree.

I have made a calculation that 200 acres (lots such as the present divisions of our townships) planted with a double row of trees, say maple, we will have a belt of trees nearly three miles long and a plantation of 300 sugar or other trees. Experience has shown that from 100 ft. square of well-prepared land, sown with ash and transplanted, you can cover 100 acres from *this 100 square feet*, and have a return after three years, using the smaller plants for hoops, poles, etc., and thinning again and again, until the residue will leave you a fine plantation, and so on with other trees. Oak, walnut, and butternut can be intermixed, as they require longer time to mature. If your soil is well prepared, your farm will begin to give a return after three years at the rate of $10 per acre, increasing year by year to $40, and then the residue will be your park. I have heretofore, through the columns of your newspapers, advocated to the Manitoba emigrants the necessity of taking up a box of our tree seeds. Trees planted in the open ground thrive better and spread out their roots to a greater distance than in the forest, and they have more hold and resistence to the elements,—and I am persuaded that no better investment could be found for the Manitoba farmer, because such a plantation would break the heavy winds that sweep the prairies, and guard his home and crops, and shelter his farm, and give him in return exactly what he has the most need of—timber for all purposes.

Still further light is thrown on this subject by the following paper contributed by Mr. James Little, of Montreal, and read at the Cincinnati meeting :—

THE WHITE PINE FORESTS OF CANADA.

By James Little, of Montreal.

The devastating effects of freshets, the barrenness of sections of the country deprived of timber, and the failure of supplies of water to streams during the summer months (which years ago were well supplied), and which I believe to be mainly due to the destructive habit that has obtained of clearing off too much of the forest land—these questions, however, I leave to others who have given them more thought, and confine my remarks to the condition of our own White Pine forests, and the serious commercial effects which would arise from a total loss of our woodlands, a condition likely soon to reach us unless we immediately adopt measures for their protection, and begin, by tree-planting, to supply the waste.

Labouring, as I may say, almost single handed for a long time to bring our own people, as well as yours, to a proper knowledge of this subject, it is most gratifying to me now to find the papers of your country so generally taking up the question of Forestry, and, when I say that I wish your association the greatest success, it but faintly expresses my feelings, and I hope that the eminent men, who are now giving their minds to this great question, having the valuable statistical information that Professor Sargent has obtained to aid them, will keep it before the people till a proper appreciation of its importance is generally acknowledged.

I may remark that, while my efforts have been mainly directed towards the protection from destruction of the forests of White Pine, it has been painful to me to witness that our other commercial woods, such as walnut, once so abundant in certain sections that farmers used it for fence rails, and oak and ash, which were for long a great source of revenue to the country, are nearly all gone, and our pine, spruce, birch, and tamarac are following so fast that we will soon have nothing left of commercial value; and the same process of denudation has gone on in your own limited area of woodland, as is so plainly shown in Professor Brewer's excellent map, published in connection with the census of 1870, where the area of treeless territory, as compared with woodlands, gives your country the appearance of a large, cleared farm with patches of woodland on its outer edges.

I know that the idea prevails, on your side, that the area of timber land in Canada is so great that the supplies are practically exhaustless, but this idea, I regret to say, is not borne out by the facts. With the view of arriving at some definite knowledge of the quantity, I have consulted with the best authorities we have, and am fully persuaded that 10,000 millions of feet, board measure, will comprise all the merchantable pine of the Provinces of Quebec, Ontario, New Brunswick, and Nova Scotia, and, as we are drawing from these points over one thousand millions annually, less than ten years at our present rate of cutting will use up our whole stock.

It may also be as well to remark, as frequent mention is made of the pine of Newfoundland and the Hudson' Bay country, that, as regards Newfoundland, it is only near the streams, ponds, and bodies of water that the white pine is found, and it was never abundant or to any great extent of a large size or good quality—the best of it has, moreover, been shipped from this country principally to Nova Scotia. The White Pine spoken of near Hudson's Bay evidently refers to the spruce, which is miscalled Pine and White Pine in some of the British markets. The only pine found near there is the Banksian pine, an inferior timber tree, seldom large enough for sawing, and its nothern limit is south of both James' and Hudson's Bays, as may be seen on Prof. Bell's map showing the northern limit of Canadian trees.

To give anything like a correct estimate of the remaining stock of standing pine timber is most difficult, as the Governments seem to know little or nothing on the subject, and the owners of such property have private reasons for withholding what knowledge

they possess, but the following statistics, which I prepared at the request of Prof. Sargent, gives the result of my investigations.

For the Province of Quebec, we may consider the country south of the St. Lawrence as still having 250 million feet, the principal streams being the St. Francis, Nicolet, and Chaudière ; the country on the north shore of the St. Lawrence, east of the city of Quebec, 250 millions, the principal river being the Saguenay ; the district north of the St. Lawrence, between Quebec and Montreal, 750 millions, the chief source of supply being the St. Maurice ; that on the north shore of the Ottawa, between Montreal and Ottawa city, 1,250 millions, the principal streams being the Gatineau, Lievre, Nation, and Rouge ; and from Ottawa to the headwaters of the Ottawa river, on the same side, 2,500 millions, the main sources of supply being the rivers Coulonge, Black, Dumoine, Bear, Maganacippi, and Keepowa, and lakes Temiscaming and Des Quinze, with the lakes and rivers forming the head waters of the Ottawa—making a total for the Province of Quebec of 5,000 millions.

For Ontario we may estimate the streams flowing into the Ottawa as still having 1,250 millions, the chief supplies coming from the Madawaska, Mississippi, Bonnechère, Petawawa, Matawan, and Montreal rivers, the country drained by the waters of the Trent and Moira, 750 millions ; the streams entering into Georgian Bay, 750 millions ; and supplies from other portions of the Province, 750 millions—making a total for Ontario of 3,500 millions.

The pine still remaining in New Brunswick and Nova Scotia will probably not exceed 1,500 millions. Thus making a total for the four provinces of 10,000 millions—an amount less than one year's consumption of your country.

But, whether the amount may exceed this estimate, which I have made from the best sources of information attainable, or not, there is one thing sure that our hitherto magnificent forests of pine are about gone, and the remark of Mr. Charles Gibb that "our native White Pine may yet be peddled in some parts of our country as a rare exotic, so scarce has it become," is certain to be realized in the near future.

The remainder of this interesting paper appeared in our report of the Cincinnati meeting.

Another and very potent cause of denudation, and one which produces far more disastrous results than the lumberman's axe is

FOREST FIRES.

Previous to the discussion on this important subject, already referred to at some length in our report on the Montreal meeting, Mr. J. K. Ward, of Montreal, read the following very practical paper :—

In appearing before you to-day as a practical lumberman, anything I may say will be based on my experience as such, and should I succeed in contributing ever so little in shaping a policy that will promote the industry we are engaged in, and at the same time do something that will preserve for years to come the material on which that industry depends, we will no doubt get our reward. It is a common saying that cotton is king ; this may be a truism in some places, but it will not hold good in Canada, as king lumber reigns over us. In support of this assertion, I will resort to a few figures to show its importance to us as a nation. There is manufactured in Canada approximating to two thousand million feet of lumber and timber B.M. per annum, using up say twelve million saw logs, 18 in. x 12 ft. for pine, and 14 in. x 12 ft. for spruce. Nine-tenths of this lumber is exported, for which we get in return some $25,000,000. To produce the above quantity of timber and lumber it would require 3,000,000 acres of land to be cut over, averaging say 2,000 feet per acre, which I think is a liberal allowance. But it is a difficult question as to how much of our country would yield the quantity above named. There can be no question as to the necessity of taking all the means at our command to make the best use of what standing timber we have, in utilization and protection of it ; first, in greater economy in manufacturing, both in the mill and in the woods, turning to better account the slabs, etc., in the former, and discouraging the making of square

timber as much as possible in the latter ; second, that on Government lands the law as now applied to pine should extend to spruce and tamarac, *i. e.*, no tree less than twelve inches at the stump should be cut down for commercial purposes ; third, the greatest dread of the lumberman, fire, should be more closely watched. In my thirty years of experience, I have come to the conclusion, that the most of the bush fires has been the work of fishermen and hunters, who not only destroy valuable timber the property of the public, but also the shanty and material of the lumbermen ; in view of this being the case, I would suggest that the Government who is most interested in the preservation of forests, employ as many men as are thought necessary in each agency, to look after and trace the origin of fires on the public domain, giving them the power to take evidence so as to bring to punishment those who either wantonly or carlessly set fire to or cause the destruction of such valuable property. I would also suggest that no lands unfit for settlement should be offered for sale ; from what I have seen in my travels on the rivers running into the St. Lawrence and the Ottawa from the north, a very large proportion of such territory is of this character. In selling lands to settlers I would make it a condition of sale, that twenty acres in every hundred should be given free, and that it should be forever kept as woodland. I would say in conclusion that the lumberman is not the vandal some would have him appear to be ; he is usually the forerunner of settlement ; on most of our rivers he makes the first roads into the woods ; his deserted shanties and stables often become the home of the pioneer farmer, furnishing employment for the young men and their teams, and giving the best market in Canada for his hay and oats, for which he usually gets twice as much at his door as he would down at the front. Neither does he look on trees as enemies, nor cut them down for sport. To the uninitiated travelling through the woods, after the shantymen have taken all they think worth taking, he would hardly notice that the chopper had been there, except for seeing an occasional stump, a few chips or a top of a tree, the great bulk of the timber remaining to attract the rain, hold back the water in its natural beds, and to prevent sudden rises and falls in the rivers, which oftentimes cause serious damage by overflowing the banks or becoming so low that they refuse to do the work they once performed with ease, and the miller sighs for the friend that so fully helped him. To avoid these troubles and have our country remain well wooded for many years, it is but necessary to give the trees indigenous to our country leave to grow, and there will be no necessity to plant. I have no doubt but that much of the land that has been denuded of its timber, would in a few years be covered with a spontaneous growth of wood and so prevent our country from becoming an arid waste, utilizing only that portion of it that can be profitably worked.

While we have not yet experienced the full climatic effects, which eventually arise from denudation carried too far, we may draw lessons of warning from other countries and amend our course before it is too late.

In our report on the Cincinnati meeting is embodied a paper setting forth in a very forcible manner the results of extreme denudation in other countries. The following abstract of a paper read at the Cincinnati meeting by the Hon. David H. Bailey, late Consul-General of the United States for China, resident at Shangai, sets forth the droughts, famines, and floods of that country resulting from deforestation.

DROUGHTS, FLOODS, AND FAMINE IN CHINA,

By Hon. David H. Bailey.

It is generally admitted, he said, by foreigners who have travelled or resided in China, that the ignorance of the people and the apathy of their rulers have resulted in the denudation of their forests over vast tracts of country in many provinces of that extensive empire. To removal of the trees and that herbage which should retain the moisture necessary for the constant fertilization of the soil may be traced, in a large degree, the many appalling droughts and devastating floods which have decimated the people and inundated the country. The tables accompanying this paper, of the droughts and floods

which have occurred in China from the commencement of the T'ing to the end of the Ming dynasty (620-1643), demonstrate the disastrous effects of this deforestation. These droughts not infrequently lead to cannibalism, especially in the latter part of the period named, when, it may be persumed, deforestation had reached its fullest development. Perhaps famine has never attained such fearful proportions as recently, 1876 to 1880, in the five great northern provinces of China, where, out of a population of one hundred millions, in an area of something over three hundred thousand square miles, from ten millions to thirteen millions of people—in some districts six-tenths, in others nine-tenths of the population—perished of starvation. The details of these sufferings furnished by the Committee of Relief, as stated in this paper, are harrowing in the extreme. Human flesh was sold openly in the markets. From eating those who died of starvation, they came to killing the living for food—according to the memorial of the Governor of Honan to the throne; not the poor alone but the wealthy suffered most horribly, and finally fell upon, killed and devoured their own wives, children and parents.

The Committee of Relief, composed of foreigners, long resident in China, attributed this calamity entirely to the extreme denudation of forests, and consequent desiccation of the soil. This deforestation was remarked by the Jesuits a century and a half ago, Shansi, formerly opulent and prosperous, the favourite abode of the princes of the Ming dynasty, has, through four centuries of neglect, deforestation and famine lost its wealth, fertility and prominence. This deforested region has for centuries been subject to the scourage of drought and famine.

The southern portion of the province of Chihli is an enormous plain, once celebrated for its fertility, now a treeless, poverty-stricken waste. Some streams have disappeared to develope in other directions, and the large lake of Pei-hu, noted in the Jesuit maps, has disappeared. The ground becomes covered with a white saline exudation fatal to fruitfulness. Great sand-storms frequently arise from and sweep over its surface, filling the air with sand, which penetrates as far south as Shanghai. For forty miles around Tientsin the soil is desiccated to the depth of seven feet, and below there is nothing but salt earth, abounding in nitrate of soda.

It is a singular commentary on the inconsistency of the Chinese character, to say that they have a superstitious veneration for trees, and yet, in many districts and provinces, they destroy their forests. There is scarcely a village in treeless Shansi without its old sacred tree covered with inscriptions. Yet it seems from this paper of Dr. Bailey's, that China is wealthy in coal fields, such as make the use of wood for fuel unnecessary. Each of these devastated provinces will average more square miles than the state of Ohio.

These tables before mentioned, record 627 droughts within a little more than one thousand years, and in the years from 1328 to 1640, nineteen occasions are recorded where the people in their dire distress resorted to cannibalism. Within one thousand years four of these provinces have on an average been visited by tremendous rains and floods every 21.7 years.

The description of the floods of the Hoang Ho, "China's Sorrow" it is sometimes called, reminds one forcibly of the floods of the Mississippi, to which it furnishes a parallel. The great plains of Chihli are also inundated by the rush of floods from the Petho and Wei Rivers. In A.D. 792 this vast plain was covered with water to the depth of twenty feet. Since the floods of 1871 and 1875, the soil appears to have lost its productive force. The Fen River in Shansi has the same torrent-like propensities, which are characteristic of all the streams in these vast and treeless regions. Many other instances might be given. It is quite certain that these plains, which were once a hive of the human race, are gradually losing a large portion of their population.

The wanton destruction of their forests have not only produced extraordinary floods and droughts destroying millions of people and an incalculable amount of property, accumulated by the toil of persistent and plodding industry, but is slowly preparing a desert out of a soil which was once famous for its fertility. It is a warning to the people of this country.

Turning from the consideration of these lamentable results which have been experienced in the countries referred to, we present a paper setting forth the beneficial effects upon the health of the community resulting from the preservation of a due proportion of forest in every extended area.

FORESTS AND HEALTH.

A Paper read before the Forestry Congress, Cincinnati, April, 1882, By Dan. Millikin, M.D., Hamilton, O.

Mr. President :—When I attempt to discourse of the influence of forests on health, I am embarrassed, not alone by the importance of the subject, but by the very magnitude of the claim which I feel bound to make for the trees. My thesis is nothing less modest than this, *Trees conduce to health, and the more trees the more health.*

Whence comes our health ? Firstly and chiefly it is an inheritance from sound ancestors, next and secondly it comes from personal habits, thirdly it depends on climate, fourthly it depends on the sanitary or insanitary state of one's home.

It cannot be pretended that trees and forests have much to do with the physical constitutions we have inherited from our ancestors, nor even, directly, with our personal habits. It remains for me, therefore, to say something of the influence of trees upon climate, and upon the sanitary condition of homes.

The most obvious and beneficial modification of climate by forests is by the arrest of winds. This action, I am sure, is everlooked by city-bred persons, and by many who have led a rural life, but have not had their eyes unsealed. On a bleak and windy day the beasts of the field may be found standing on the lee side of whatever trees are in their range, and a little investigation in such humble company will show that even a single tree standing in the cutting blast has an invisible wake of calm stretching away to a considerable distance. A thin over-grown hedge, through which one might almost walk, will produce something like a calm in its neighbourhood, and an ordinary forest of deciduous trees absolutely arrests the wind near the earth. I bring up this topic first of all, not to discuss the subject of wind-breaks, for that subject will be well discussed in this Congress, but to remind you that a windy climate is, in general, a bad climate ; that wind interferes with health as well as comfort ; that it pinches hearty persons, and is ruinous to invalids ; that it interferes with good ventilation, and with the moderate uniform warmth which should prevail in our houses. A windy climate is a climate of shivers, and snuffles, and colds, and consumption. Therefore I say that the more trees the less wind, and the more trees the more health.

A less simple and obvious proposition is made when we say that forests modify climate in the matter of temperature. We must confess in the beginning that the mean annual average temperature of a wooded region will be about the same as if it were stripped bare of trees. But mean annual averages have very little to do with health. What concerns the physician and sanitarian most is the extent and the rapidity of the oscillations of temperature, and in this matter, as in all things, the forest is conservative.

For it has been positively ascertained that every tree has a certain body-heat, bred by the chemical and vital processes which take place within its rind. This heat is greater when vital processes are most active, but it is appreciable by the infallible thermometer even when tree-life seems to be dormant in winter. For this reason alone—because each tree is an actual generator of heat—the forest warms the air that sighs and whispers through its branches. We have just noted the fact that comparative calm prevails in the forest, and are hence prepared for a statement that when a cold storm descends upon a region, the forest acts as a reservoir of warm air, which is slowly displaced and is given up to mitigate the chill. Nor may we forget the stores of water which the forest holds in its spongy soil, nor that this water has, of all things in nature, the highest capacity for heat, and, once warmed, can give back more heat than an equal weight of any other substance. Bearing all this in mind, we say that in winter every breath from the woods is warmed and tempered by the hoarded heat of summer.

And what is the influence of the forest on summer temperature? In the first place the body-heat of trees is far lower than the summer temperature. Then, since trees in summer are constantly elevating enormous quantities of water from the earth to the air, they cool the air by so much as the earth's moisture is cool. Trees not only elevate water, but evaporate it into the air, and, knowing this, it is no extravagance to say that every leaf is a refrigerator the whole summer long. Turning our thoughts again to the forest soil, we find that, sheltered from the sun, it slowly gives up by evaporation the moisture accumulated through the winter, and in that way greatly cools the atmosphere. Every process whereby the air is warmed in the forest in winter, is reversed or discontinued in the summer, and every breath that comes from the woods in summer is tempered by something of the winter's cold.

In 1875 Ebermeyer of Bavaria enlightened us as to this power of the forest to equalize the diurnal and seasonal vibrations of temperature, and his doctrines have been confirmed by further tests. He found that during the day there was, in summer, a steady outflow of cool air from the forest at the level of the earth, while during the night the forest remained warmer, and received an inflow of air from the open country. Extending his thermometric studies over many months he found that the maximum temperature of the forest was 9° F. lower than the maximum in adjacent open spaces, and the minimum temperature of the forest was nearly as much higher than in the adjacent open spaces.

The forest, again, has a governing, restraining, conservative influence on another of the conditions which constitute a climate, namely, the humidity of the atmosphere. The secret of this influence lies partly in the soil. The forest soil, in the first place, is traversed by roots, living and dead, and these are so many conduits to conduct rain-water into the soil. Over the subsoil so pierced and traversed by roots, is a heavy layer of humus, highly absorbent and hygroscopic, over all this is a layer of leaves, twigs, branches, bark and moss, and, as our great, dead master has taught us in his latest lesson, through all and above all these layers of the forest soil are the channels of earth worms, and the fine earth which they have elaborated. So constructed, the soil of woods is actually an enormous sponge, with incredible power of arresting and detaining rain-water; and, saturated in cool, rainy seasons it becomes a vast reservoir from which the parched air of dry seasons acquires needed humidity. Nor must we in this connection forget to mention again the enormous evaporation from the leaves—which, by the way, is greatest when it is most needed.

How just a treasurer is the forest, then, of all the elements of a good climate! It is an agent that can mitigate the fierce heats of summer, and detain and warm the biting winds of winter; and hoard up the redundant rains to yield a portion again when summer has parched soil and air alike. Impressed by truths like these, Alexander Buchan has declared that the climate of forests is so equable, that it is comparable only to the climate of islands.

But what has all this to do with health? A variable climate is an unwholesome climate. Other things being equal—an equable climate is a good climate. Sudden excess of heat is enervating; sudden excess of cold is the common breeder of catarrhal diseases in general, of pulmonary diseases, acute and chronic, and of the more acute inflammatory diseases of the abdominal viscera.

Of the relations of health to atmospheric moisture we know only this: that sudden and incessant changes are injurious. There are salubrious dry climates, and salubrious moist climates, but the climate that is notably dry to-day and notably moist to-morrow, is not a good one from the physician's stand-point.

A common objection to these doctrines is often put in this shape:—Climate is a result of world-wide causes. Only a small portion of the earth's surface is dry land, and only a small fraction of the land can ever be covered with forest. The influence of the forest upon climate is therefore trivial.

The truth is, however, that while the general climate of the wide world is hardly affected by the existence of forests, yet local climate is greatly modified, and, in almost all cases, is modified for the better. The natural investment of animals, and our own artificial clothing does nothing to modify the temperature of the world or of the cosmos, yet how invaluable is it to the individual!

Treeless regions are the breeding places of storms that seriously affect health in regions like this, that are not yet wholly deforested. If we enquire whence comes the deadly cold storms that so fearfully increase the winter mortality of children, and of old persons in the Mississippi Valley, the unerring arrows of the Signal Service point to the north-west. Seeking further, we find that these "blizzards" come into the United States from a region still further to the north-west, and meteorologists are assured that they are bred upon the vast treeless plains in the British possessions, where radiation is unchecked by an arboreal investment. It is believed, also, that the sudden, cold, north-east storms, which in Europe so greatly increase the winter mortality, descend from the great treeless plateau of Asia, bringing a taste of Siberian horror to the capitals of Europe. It is perfectly certain that the deadly dry winds which sometimes sweep, hissing hot, across our Mississippi Valley are engendered in the great treeless region lying this side of the Rocky Mountains, and it is equally certain that similar winds coming into Europe from the south are bred in the treeless African Dessert. Russia, even Russia, with all her inertia, is moving to increase the extent of her Siberian forests for climatic reasons. It is certain that, for economic reasons, the great prairies traversed by the terrible "blizzards" will soon become a fairly wooded country. Kansas, Nebraska, Missouri, Iowa, and Illinois are planting trees, and even Colorado is afforesting a portion of her domain, until, perhaps, in this very spot men now living may live to see a climate more equable in summer and in winter.

We may partly understand what may be done to ameliorate climate by tree-planting, when we reflect upon the frightful mischief that has been done by the axe in many quarters of the world. In Europe, within recent historic times, the climate has so greatly changed that the limits of vine-growing have been continuously contracting. Beautiful Palestine, ravished of her woods, has become an uncanny desert with a fickle climate. The Appenines have been stripped, and the adjacent parts of Spain are noted no longer for salubrity—but for terrible deluges, drouths and cold storms. The climate of New England has been greatly modified in the last one hundred and fifty years, and always for the worse. In Algiers marked changes in the climate have followed upon the deforesting of extensive tracts, and wonderful results have followed the systematic planting of other regions. The islands of the sea have been made so many isolated experimental stations, where men have learned how essential to health the forests are ; while on some of them the conclusive test of re-foresting has been made with a return of showers, and a more equable distribution of heat and cold. Saint Jago, the chief of the Cape de Verde Archipelago, was, at its discovery, clothed with a forest which has been recklessly destroyed. Rain is now lacking sometimes for a whole year, a green leaf can scarcely be detected over what were once fertile lava plains, while certain of the harbours of the island have been filled up by the precious soil of the island, which has been carried down by the fierce torrents which, alternating with drouth, curses this naked island. Similar results have followed the destruction of forests on St. Helena, the Mauritius, and certain of the Canary Islands. For this central region of the North American continent we must admit that, while trade and the arts have left our hills more bare than ever they were before, there was not in eighty years a summer so horribly hot as the last summer, nor in the memory of man a winter so rigorous as that which preceded. If, in that year, a pestilence had come upon us, it would have been the subject of our thoughts, our plans, our prayers, and our dreams. But no pestilence stalking through the land ever caused half the mortality that was caused by that frightful winter of 1880-81, and the sickening summer that followed. To arrest a pestilence by quarantine, the State sternly interrupts trade, travel and pleasure ; but the far greater mortality from the increasing fickleness and cruelty of our climate can be arrested by the gentlest means. It is needed only that our broad States shall have one fourth or one fifth of their surface covered with trees—which, by the way, may be so distributed as to increase the value and producing power of lands. It is needed only that the road-sides shall be well planted, that all hills shall be fixed forever with woods, that the rivers shall be fringed with appropriate species, and that woods shall be wood in fact, and not struggling collections of the dying monarchs of the primeval forest. Along with a better climate will come not only the better health and longer lives, which I preach to-day, but forgotten springs will gush anew from the

hills, the attenuated streams will fill their banks again—and yield us a better fish supply —and will cease to drown the valleys with floods after every rain.

Trees, I believe, chemically alter the atmosphere in such a way as to increase its salubrity. They are living, breathing organisms and, under the stimulus of sun-light, they exhale a great quantity of oxygen. A portion of oxygen thus exhaled, assumes that allotropic form which the chemists have named *ozone*. By virtue of its powerful oxidizing powers, ozone probably conduces to health in a high degree. It is produced in the forest not only by exhalation from the leaves, but also by the slow oxidation of essential oils such as lend their perfume to aromatic plants and fragrant flowers. It is produced, also, wherever slow oxidation or fermentation takes place, and especially where turpentine or terebinthinate compounds are oxidized in the presence of water. For these reasons the air of forests, particularly of pine forests, is charged with a large amount of ozone, while the air of towns has absolutely none.

Ozone disinfects decomposing animal matter and is capable of destroying miasms and disease-germs, and constantly conduces to health.

And now, having so far advocated our thesis that the more trees the more health, common scientific fairness requires us to entertain the reverse side of the question and enquire if ever, under any circumstances, trees are injurious to health.

The popular opinion regards the woods as the breeding-place of malaria. The popular opinion in this embodies a vulgar error. All the conditions for breeding malaria are not known; it is a fickle crop and will not grow where all known essential conditions seem to be present. But we know that air, moisture and abundant sun-light are essential, and in the dark, primeval woods of all countries, the malarial fevers are almost unknown. About the margins of streams and rivers, in half-dried swamps, and especially where salt and fresh waters meet in brackish swamps, the malarial poison is most concentrated and malignant. It is very true that the pioneers who were woodmen, were great sufferers from ague and intermittent and remittent fevers. But this, I think, was not because they lived in the woods, but because they were compelled to clear away the forest and admit the sun-light, and turn the virgin soil. Freshly exposed soil is unfortunately the favourite nidus of the malarial poison. The draining of ponds, and necessary excavations for streets, roads and railways, have in hundreds of instances developed severe endemics of this sort. But the connection of shaded soil and malarial diseases, has no scientific justification.

And we may even go further and declare that plant life is absolutely antagonistic to malaria. In this region where there are many of its isolated breeding-places, it cannot escape notice that even a thin or narrow belt of woods will defend a strip of territory from the malarial influence. In some mysterious way the poison is neutralized in traversing the woods, and health prevails on one side as surely as disease reigns on the other.

Bowditch, of Massachusetts, in 1862, presented facts which led almost to a demonstration that soil-moisture develops pulmonary consumption, and by him we should be warned. It is possible that on damp, tenacious soils trees may be so massed about dwellings as to keep the soil too damp. Supposing a house to stand on good rolling soil, well drained and underdrained, this would be impossible, but, out of abundant caution, it would be well to keep dense masses of shade some little distance from dwelling-houses. Let the trees that come into closest companionship and look into our windows be few; let them come not too near. And let them be lofty, so that their shadows may sweep over long arcs as the sun swings round his daily course. Then the dangers of damp soil and damp walls will be wholly forestalled.

While they should not come too near, there is one good sanitary reason why trees should come somewhat near our homes. Civilization requires and creates fixed homes, and the social instinct tends to bring these homes into groups. From this it comes to pass that the soil about our dwellings becomes saturated and oversaturated with organic matter. The defilement of the surface soil with vast quantities of slops and suds and scraps of organic matter is an evil, but the continual pollution of the sub-soil, is a far more serious matter. Superficial filth may be removed, and, if not removed, is capable of oxidation, so as to become innocent in time. But subterranean filth can neither be traced nor removed, and is beyond the influence of oxidizing influences of the air.

One sort of subterranean filth is especially dangerous. To dispose harmlessly of the excreta of men and animals, is a problem which baffles civilization. On farms and in villages the vault or cess-pool, if water-tight, becomes a hideous, festering mass of liquid rottenness; if, as is common, it is not water-tight, its contents are only a little drier, because the liquid filth permeates the sub-soil and oozes away. Oozes away, whither? Profitable inquiry!

For obvious reasons most towns and villages lie in valleys and are built upon alluvium—gravel, sand, or sandy loam—a sort of soil that is very permeable to all sorts of fluid, clean or unclean. The wells, we must remember, are dug in this same sub-soil, and are dug deeper than the vaults, sometimes fifteen and rarely more than fifty feet distant from the vault or cess-pool. The uniform distribution of filth through the sub-soil of towns, situated according to our hypothesis, would be only a question of time, but, since the soil-moisture is constantly changing its level with the varying rainfall and the varying level of water in the streams near by, the distribution of organic matter through the deeper strata of the earth takes place with great rapidity, and becomes a question of very brief time.

It is a curious fact that only savages dispose of their dead in a way to make them harmless to the living. In lower grades of culture, men have been wont to make harmless disinfected mummies of their dead, or have left them on elevated platforms where the dangerous products of decomposition are diluted and destroyed in the great atmospheric ocean, or have exposed them to the carrion-eating birds of the air, or have consumed them with purifying fire. Under our grade of civilization, the dead are rotted underground, near the church, and the church is never far from the crowded haunts of living men.

The microscopist, the sanitarian, the physiologist, the practical physician and the surgeon, each on his own line of investigation, has come to the same conclusion as regards these subterranean stores of filth. They are not only poisons themselves, causing general malaise and gravely lowering the vital powers, but they constitute a nidus, wherein low organisms breed—organisms which are associated with the most deadly diseases, typhus fever, typhoid fever, diptheria, etc., etc.

It was from such deposits of organic matter, that the mediæval plagues took their origin. It is in such depots of accumulated rottenness, that the Asiatic cholera grows strong and malignant, and carries death to all continents. It was this sort of filth, hidden for long years under Sandringham Palace, that poisoned the heir of England, and well-nigh cost him his life.

And what can we do with it? We dare not dig into it, if there were men and money enough in the world. We cannot inject chemicals into the soil to decompose it, for who will tell us how deeply, or how far, or in what directions filth will extend itself from a given focus of distribution? But the blessed trees, we may be sure, will traverse all strata of the earth in search of organic matter; their roots find it and feed upon it; they alter it, chemically, as essentially as if it were burned; and they elevate it into the air in forms of beauty and of use.

I have now completed such brief review of the influence of the forest on man's physical health, as the occasion allows. But I trust you will suffer me to use an abused term and say that the forest has an influence upon the æsthetic sense, which a liberal sanitarian and wise physican cannot afford to ignore. Life without beauty is a dead and unwholesome thing, truly, though we have heard the doctrine preached from unworthy lips of late, and whatsoever ministers to the æsthetic sense, ministers to complete health. We may not scout at smaller vegetables while we praise the trees, for all things that grow are of use. Even thistles were made for asses to chew, and sunflowers for the delectation of more refined donkeys. But trees, I think, are fit to minister to a manly man's thirst for beauty. A treeless land is not commonly a land of health for body or soul, and he who enters into the companionship of trees, knows more than most men know of æsthetics.

Beauty and goodness we know are closely akin. As the sturdiest crops and the most exquisite wild-flowers grow near the woods, so the greatest and the rarest of mankind and sweet womankind have been educated, nurtured, developed and inspired by the woods. A very great part of our wisdom had its strong roots in the academic groves of Greece.

The great monarchs of the earth have been the forest kings. Of our American Presidents only two or three could be called city-bred, and the six Presidents whom the world would now agree to call great—Washington, Jefferson, Jackson, Lincoln, Grant and Garfield—all of these were born in the woods, were educated in the woods and by the woods, and spent their stout young manhood among the trees. Most of the masters in literature, were masters of wood-craft. The true poets are all forest-poets. The great writers of romance are nearly all lovers of trees, and the most wonderful of all imaginations has made us actually know the Forest of Arden, and Birnam Wood, and Windsor Forest. The inspiration of the woods has always been a healthy, hearty one, for great men and small men alike, and I know there are none here who cannot find in the woods all that is worth asking for, as in the chief petition of Lowell's "Beggar":—

"A little of thy steadfastness,
Rounded with leafy gracefulness,
Old oak, give me,—
That the world's blast may round me blow,
And I yield gently to and fro,
While my stout-hearted trunk below,
And firm-set roots unshaken be."

The sanitary value of forests, according to our present light, is thus summed up by George L. Andrew, M.D., of Laporte, Indiana, in his paper on this subject:—

1. Forests increase the amount of condensation over their own areas, but by reason of the amount intercepted by their leaves and stems, the annual rain-fall at the earth's surface is not, perhaps, materially affected by their presence or absence, in regions well covered with other vegetation and thoroughly cultivated.

2. By means of their interlaced roots, mosses, lichens and humus, they check the efflux of superflous rain-fall, thus regulating the water supply in streams and springs, and decreasing the proportion of the annual percipitation that is borne to the sea by the natural drainage of the country.

3. Forests diminish the evaporation from the earth's surface—the evaporation from a surface of water in the woods was 64 per cent. less than outside the same—but this deficiency is much more than compensated by the increased evaporation from the leaves.

4. Trees modify temperature; wooded countries being warmer in winter and cooler in summer. This they do by radiation, but owing to their slow conducting power the times of their daily maximum and minimum do not occur until some hours after the same phases in the temperature of the air, thus distributing the heat of the day more equally over the twenty-four hours. The yearly variations of temperature in the woods and the daily variations in summer are less than in the open fields, and it is well known than an equable temperature is the most conducive to health.

5. Forests and tree belts are of undoubted value in preventing the dissemination of malaria.

6. Trees are of positive sanitary value in affording shelter from the excessive heat of the sun, and from the violence of winds.

7. The importance of devoting to forests all regions unfit for profitable culture, and of protecting them by an enlightened public sentiment, as well as by legal enactment, is both a sanitary and economical necessity.

The following papers present further arguments of a similar character for the preservation of a due proportion of our forests:—

WHY SHOULD WE PLANT TREES?

By Dr. A. Eby, Sebringsville, Ont.

As trees perform an important part in the economy of nature, wisdom demands of us that we should assist her in her work, instead of interfering with it, as is too often the case. Trees are not only valuable for their fruit and their timber, but are useful for their moderating influence on the climate. Not only do trees act as wind-breaks—a

very important matter to the agriculturist—but they act as storehouses of moisture and distributors of electricity. The influence of trees, and especially forests, on the rain-fall and the flow of springs is so well known by the dire experience of the old world, that it is only necessary here to refer to it. Doubtless the cyclones, so common and so destructive in the Western States, whether we consider them as violent winds only, or as discharges of electricity, are due to the great scarcity of trees on the prairies. The prairies being nearly destitute of trees, the winds sweep on unchecked, and when one current comes in contact with another, coming from a different direction, the united current takes a direction of its own and sweeps on with resistless fury until its force is spent. So with electric storms; on account of the great want of trees, there is no adjacent communicating medium between the earth and the air. The positive electricity in the air is not neutralized by the negative electricity of the earth, so each gains strength by accumulation until they meet with some intercommunicating objects, when a discharge takes place with destructive force. What now occurs on the treeless prairies will take place in the older states, and in this Province if the destruction of our forests is permitted to continue without compensating for it by the planting of trees sufficient for the harmonious working of the laws of nature.

But trees not only act as distributors of electricity, but as storehouses of moisture. The immense surface of the leaves, when the surrounding atmosphere becomes dry, exhales moisture and thus retards the destructive effect of a dry atmosphere on vegetation. Prof. Williams, of Vermont, obtained sixteen grains of water in six hours from two leaves and a bud which he had sealed up in a bottle while yet attached to the tree. From this we may form some idea of the immense amount of moisture that is thrown off by a large tree. It has been shown that the evaporation from an acre of forest, during a whole season, is much larger than the total amount of rain-fall it receives during the some period. Where do the trees obtain this excess of moisture exhaled over the amount received by the rain-fall? It is absorbed from the atmosphere at times when the air is surcharged with moisture, and it is laid up until such time when the surrounding atmosphere again becomes dry.

But trees, and especially forests, by which I mean larger collections of trees, not only act as storehouses of moisture, but of heat. Who has not felt the agreeable sensation of warmth when coming to a forest while out driving during a cool summer night? The leaves prevent the radiance of the heat of the earth, while in the open country on a clear night the heat of the earth is rapidly diffused into space. Thus forests retain warmth a longer time than the open country; and we often find that tender plants near trees have escaped injury by frosts, while those not so protected were destroyed.

We thus see that trees play an important part in the economy of nature during the season of vegetation, but they are also valuable as shelters and wind-breaks during the winter. Even small clusters of trees afford a large amount of shelter against a storm, and who could calculate the beneficial effects that would be produced if several rows of trees were planted along our roadways as well as along line and division fences. Such extensive planting of trees would give us almost the full protection of a forest in the winter, while it would give us cooler and less parched fields in the summer.

I have so far not taken any consideration of the value of trees as timber or fuel. Long before even the next generation will have passed over to the majority, will the present supply of timber be exhausted, so that building material must to a large extent be imported from foreign countries, that are less wasteful of the bounteous supply a kind providence has provided. We owe it to our descendants that we leave the world no worse than we found it. We may call a certain part of this world's goods, be it in lands, in houses, in cattle or sheep, or in gold or silver, or whatever other form it may be in, our own, but in reality we are only the temporary trustees of it. We come naked into the world, and no matter how large an amount of wealth we may acquire, we must leave it all to others, who in turn have to leave it to others again. So in reality we only play the part of trustees while we are here, and as the world no more belongs to the present generation than it did to the one that went before us, it becomes our duty so to administer the estate entrusted to us, as at last to leave it no worse than we found it. We owe it to our successors that we give them a fair chance in the race of life.

We cannot say that we have done so, if by destroying our forests we deprive them of a supply of timber, and prevent the moderating influence exercised in nature by trees, without having made an effort in compensation, by re-planting, for the destruction we have caused. Our successors will not only need timber for building purposes and fuel, but they will require the moderating influence of trees on the atmosphere to render the soil productive, and thus give them a fair chance of existence. Long ere new timber can be grown will the present supply be exhausted, and even the abundant deposits of coal will not be sufficient to supply the demands that will be made on them for fuel, when the supply of wood will be exhausted in the United States and Canada.

If there were no other, and far more urgent reasons why we should plant trees, I would say the immense improvement in the apperance of the country that would result from such general tree planting as I have indicated, should be a sufficient incentive to persons not totally blind to the beautiful, to devote at least one day in each year to tree planting. Who does not admire the beauty of a row of thrifty, vigorous trees growing at the roadside, and who, while driving along a dusty highway, has not longed for the cooling shade of such trees. To encourage tree-planting along the roadways, the owner of the adjoining soil should be given a proprietary interest in the trees planted alongside his land. But not only would the appearance of the country be improved by a row of trees on each side of the road, but if each farm-house were surrounded with a cordon of evergreens, the effect would, in a few years, be so striking that we would feel ourselves a thousandfold repaid for the trouble and expense of planting them. In fact it is surprising that people should be content to spend the long winters of our northern climes with nothing life-like to look upon. Everything the eye falls upon reminds it of death. There is nothing life-like to be seen, nothing to remind it that winter will not last always, but that the summer will in due time return with its green trees and fields. A cordon of evergreen trees around a farm-house gives it a cheerful, inviting appearance even in the most dreary wintry day. It gives rest to the weary eyes when nature all around is shrouded in white.

But the only value of such evergreens around a farm-house would not consist in their appearance or their use as wind-breaks. They would in a few years become the most efficient conductors of electricity; the protection they would give in this way would soon put an end to the business of the lightning-rod men. It need hardly be said that a farm well planted with trees along its boundary and division fences, and having evergreens about the buildings, would at any time, other things being equal, sell more readily and at a better price, than one destitute of trees. The enhancement of the value of a property by planting trees on it should of itself be a sufficient reason to induce men to plant trees extensively.

There is another, and, perhaps, to many men the most important reason why we should plant trees; their commercial value should induce every farmer to engage in tree planting as a source of gain. While some kinds of trees require many years before they have grown sufficiently large to make their wood valuable, others require but a few years growth. Mr. Budd, of Iowa, who has grown trees largely, says: A grove of ten acres (of white ash), thinned to six feet apart, containing 12,000 trees, at twelve years were eight inches in diameter, and thirty-five feet high; the previous thinning paying all expenses of planting and cultivation. Ten feet of the bodies of these trees were worth, for making bent stuff, etc., forty cents each, and the remaining top ten cents, making a total of $6,000 as the profits on ten acres in twelve years, or a yearly profit of $50 per acre. Mr. Everett is said to have sold twenty-three acres of black walnut, of twenty-three years' growth for $27,000, or $50 per acre for each year's growth. What farmer can make an equal amount by growing grain or raising cattle? It may be a long time to wait—from twenty to sixty, and even a hundred years, as is the case with some kinds of trees—for a harvest; but when it does come it is all the more valuable. It, however, does not follow that because the harvest is so far distant, that he that sows it will most likely never reap it, that therefore he will have no reward for his labour. The value of the crop even if not ripe increases with each year. It takes very few years until a properly planted forest will yield sufficient returns by the sale of the thinnings to pay for the labour and the interest on the money invested.

PRESERVATION OF FORESTS.

By Cassius M. Clay, White Hall, Kentucky.

When I speak of the preservation of forests, I propose to consider the conditions which have surrounded myself, and to give my own experience and observations, rather than any attempt at scientific generalization. When Kentucky was first visited by the white man, it was unbroken forest and prairie. The central parts of the State were covered with the finest trees—among which were the yellow poplar or tulip tree, black and white walnut, sugar maple, coffee-bean, oaks, wild cherry, etc. In places there were undergrowth, cane and wild flowers, with wild grape vines in unlimited extent. In the southern or Green River region prairies were frequent, and the growth mostly beech and oaks. Mounds, earth works, flints, pottery, and other evidences of Indian occupancy in ancient times existed everywhere, but for long centuries it had ceased to be the fixed abode of any tribe; but all the tribes of the contiguous States used it for a common hunting ground. The game was mostly buffaloes, elks, deer, the black bear, wolves, foxes, etc. The rivers were full of fish, and the waters frequented by wild fowls. The wild turkey and pheasants were also found here. The better portions of the State are underlaid with limestone, clay, iron ores, and debris, wafted in primitive times by the flow of northern waters, leaving all the elements of plant growth in minute particles on high rolling and alluvial grounds; salt, silica, etc., also abound. Upon such a soil in this genial clime with a good annual rainfall, grew the finest forests in many respects in the world.

The early hunters cared for little but game, and the forests began to be cut down to any great extent only when the agricultural class followed the hunters. The method was to find a good spring of lasting water, and there to build the log hut. To prevent injury from storms and the falling of trees, a "clearing" was generally made, and the house and the cultured fields were in one enclosure. The habit was to girdle the trees, destroy their lives, and as the limbs and trunks rotted and fell, to burn them, and then cultivate. After awhile fruit trees were introduced by seeds and stones. The birds, the woodpecker tribe especially were plenty, bored the dead trees for nests, and lived upon the larvæ of insects, there also nesting themselves. The result was fine fruit of all kinds, and unscathed vegetables. When fruit trees began to be later imported, there were brought with them those many insects, which infest all vegetable growth, and the birds following the destructive axe of the pioneer westward, and falling under the deadly shotgun, leave us to an unequal war with the smaller insects, now man's most destructive enemies.

As a wealthier and more refined class of immigrants succeeded the first two classes, frame, brick, stone, and hewed log houses were built, and some trees began to be preserved from the omnivorous axe. Then trees began to be planted in the place of the original ones—mostly black locust, catalpa, the crooked variety, Lombardy poplars, China trees, and all that class of imported stock, all inferior to the first native growth.

My first recollections were of two rows of Lombardies on the two fronts of our early brick house, flanked on the gable views with out-buildings, and scattering cedars and half-filled lines of yellow pines, with occasional native trees left for their especial size and beauty. The black locust also figured along the fence borders; all in military style! Outside the cleared fields were dense forests of untouched growth with fifty feet or more of shafts with arched tops, excluding the sun; and from the fallen leaves sprang many most delicate wild flowers, with here and there clumps of pawpaws and long snaky grape vines reaching to the top of the highest trees. The cattle and sheep ranged in common, feeding upon scant wild grass, shrubs and limbs of the large growth.

Grasses.

The earliest exotic grass was the English greensward *poa pratensis*,* now the celebrated blue-grass of central Kentucky. It followed civilization, like the honey bee, west-

* The Mason County, Ky., Historical Society lately said that the *poa pratensis* or English grass was ndiginous here—a mistake.

ward, and took hold in genial soils, excluding almost all other grasses and weeds. My father was a large land-holder, and rented out much of his land to be tilled by tenants on the shares, raising corn and tobacco, but neither he nor his tenants cut down the outside forests, being confined to fallen trees and limbs for fire-wood. The result was that only on abandoned farms or clearings did the grass take hold. I well remember how, when a very small boy, I went with the slaves to bring home at night the milk cows from a small grass field unfenced, a mile off perhaps, directed by the tinkling of the cow-bell. Now, the reason of this, our honoured President will be shocked to hear, was not to influence climate, or to revere nature by preserving these her greatest works of beauty; but to prevent trespass, and with the hope that in course of time the timber would bring a fair price.

Destruction of Forests.

As soon as the blue-grass began to be appreciated, the forests began to fall under the axe, and fences made of split rails. I give my own experience. I began by "belting" all trees of early decaying wood—beech, buckeye, elms, dog-wood, hackberry, etc.—leaving the durable poplars, walnuts, hickories, oaks, coffee-beans, etc. These trees were cleaned off as they decayed as the "clearing," and under those left were sowed blue-grass, generally on the snow to suit the time and equal distribution of the seed.

I went over twenty-two hundred and fifty acres, including the fields, in this style, cutting briars, weeds, and bushes with scythes till the grass, fed upon by sheep and cattle, formed a sod. These then were lovely parks not excelled in all the world.

Decay of Forests.

Unhappily these isolated trees began an early decay. The reasons are not far off. The roots of trees naturally run near the surface of the soil, seeking air, light, and sunshine. The leaves fall, and, unblown by winds, remain winter and summer—mulch protecting them against drouth and frost. After thinning, the leaves are insufficient or are blown afar off. Then the stems or shafts once shielded by the massed tops of trees from the sun and winds are exposed to both; and, above all, the blue-grass, running near the surface with its matted roots, absorbs moisture and all the elements of growth, and leaves the forests to decay. They begin by dying at the tops and at last perish by the rotting of the centres. So the fine trees which should have lasted centuries have all disappeared in sixty years. Of the native forests the black walnut, the coffee-bean, and the white, burr, and chinkapin oaks are the most durable here.

Happily for me, I left about fifty acres of native forest untouched, and that remains vigorous as in the beginning, when an hundred years or more ago it was first seen.

Fruit Trees.

The peach cleared of the borer, and properly trimmed, will live twenty years or more. All the seedling apple trees have died but one. An hundred-year old pear tree, reduced to a shell and almost a stump, was cut away by me with great reluctance this winter. The grafted apple tree has proved more short lived than the seedling. None of the cherries have lived over the century. The quince has passed away also.

Planted Trees

seem to be in a way to live long, because the limbs being left low, kill the grass and weeds, shelter the shafts, and generally adopt habits of durability. Of the planted trees, all survive which have low limbs: as the walnut, hickory, water maple, and sugar trees. And though the black locusts failed, it was in part, perhaps, owing to an insect which of late years has attacked and eaten up the leaves. Trees planted singly, or in groups, if left with all the branches, bid fair to live as in the original forests.

The Re-Growth of Forests.

In some lands, the pine being cut away, the oak succeeds, and the reverse. I do not

propose to discuss the question of the origin of species of plants or animals, or the elementary creation of the same. The Mosaic account I receive as at present advised, but I am always in favour of full discussion and experiment. In other lands elaborate preparation of soil and seeds and culture are needed to grow forests, even where the rainfall or possible irrigation will allow. But here, in all the woodlands at least, and in most of the cultivated fields, it is only necessary to keep off the stock and the plow, and the original forests will be exactly restored. In the prairies of southern Kentucky, once bare of trees, by these methods oak forests have been every where grown, till by such means and culture the original features of the country are entirely changed. If all the country lying west of the Mississippi river, having a less rainfall annually than twenty inches, be unfit for farming, it will probably be also unfit for forest culture. The facts should be known and submitted to at once, without further disaster there, proved by melancholy experience. Then by artesian wells, local waters, and other means, affording life, support to man and beast, the rich and scant foliage of grass and shrubs of part of the year's growth could be utilized by grazing, and winter hay, and crops suited to the rainy seasons when there are any. Sheep, and Angora and other Asiatic goats, would be well suited to many parts of the Rocky Mountains, where grass and water are found during the year; and where magnificent natural scenery would compensate for the luxuries of more civilized life.

The Effect of Trees upon Health.

Much has been said about the eucalyptus tree destroying malaria. All trees destroy malaria. The Rev. R. J. Breckinridge bought a place on Elkhorn Creek, near Lexington, where the stagnant waters when low in summer and not shaded always produced malaria. He told me that he planted sycamores and shaded the water holes, and the result was the entire disappearance of autumnal fevers.

Trees and Climate.

It has been denied that trees affect the rainfall or climate. How the sum of the rainfall is during late years compared with the old times, I am not prepared to decide. The able papers in this direction given by John R. Proctor and Robert Peter, of the Kentucky Geological Survey, give us ground to say that when the rainfall is annually below twenty inches successful agriculture need hardly be attempted, and this line of rainfall covers vast lands west of the Mississippi river, decreasing as you approach the Rocky Mountains. And when agriculture fails, trees fail also. As at present advised I would say that where there are no trees it is best to stay away. I move in the sphere of experience with more certainty. I remember when the forests were hardly broken here, that springs of water were very frequent and perennial. The rivulets and creeks and rivers had a perpetual flow; these have now changed. The rivulets and creeks are now dried up in summer, and the fish so often caught by me in earlier years are gone, Not one spring in a thousand remains. Indian corn was generally planted in March, and the rains and exhalations of moisture from the surroundings made crops successful every year. Now, the destruction of the forests has lost to us that bed of leaves which was a perpetual reservoir of water for springs and evaporation; aided by the treading of the hard surface, the rain-fall, if the same as of old, rushes off at once, sweeping the soil into the Mississippi delta. The dry winds absorb not only the ancient humidity of the air but drink up the subsoil evaporation. So that our winters are longer, more changeable, and unendurable. Corn can hardly be safely planted till late in April, and drouth too often ruins all in spite of our best efforts.

Now trees do influence rainfall within the limits of forests in a State like Kentucky, where the rain is not precipitated by mountain heights, but by the meeting of warm moist and cold winds. Here one neighbour has plenty of rain, and another scarcely any. And, even if the rainfall should be the same for the whole State, the owners of forests have reason to believe that these wind-breaks are favourable to rain eddies and rain-bearing currents of air. Here is room for future scientific inquiry and experience. One thing I have found out by artificial landscape gardening: that trees planted many deep

towards the south, make the immediate shade trees nearer the mansion cooler. The reason being that as most of our air currents and winds come from the south-west, even a few more feet of shade in that direction give very marked coolness against the hot currents of air from a sun-parched surface. And the question, therefore, must be logically put, if a few trees make such marked difference in the temperature, what must be the effect of great forests in the same direction upon animal comfort and plant growth?

Abstract of an interesting and valuable paper read at the Cincinnati meeting by the Honourable Verplack Colvin, Superintendent of the New York State Adirondack Survey:—

The influence of forests upon the water supply of any given drainage area is directly proportional to the rain-fall, and it is from the standpoint of evaporation and rain-fall that the effect of forests must be considered.

The data for the investigation must be searched for in the east, where the destruction of forest has been great. Here, rather than on the frontiers of civilization, we should look for traces of climatic change, if the destruction of forests lead to any such change.

The records of the United States Signal Service of the mean monthly precipitation in this country for many years had been searched by the lecturer for statistical information on this subject, and he had based upon these records a series of computations which showed where the greatest irregularities in the monthly rain-fall occurred.

These differences were presented in tabular form, and showed a favourable uniform monthly precipitation of rain in the Middle Eastern States. Here it is known that the approximate limit of safety of forest-cutting has been reached, as torrential action began to show itself in sections where much timber had been cut away.

The topography of the country was shown to have a most important bearing upon the quantity effect of forests upon the rain-fall; the mountain ranges, when forest-covered and extending across the path of the south winds, acting as powerful condensers of moisture. The way in which the limbs of trees entangle and kill the wind, to which a house or block of houses forms hardly any obstacle, was explained in an interesting manner, and was shown to be dependent on the angle of incidence.

The true relationship of atmospheric electricity to rain-fall was traced through the re-actions of the correlated force, so often incorrectly termed "latent heat." The limbs, boughs and leaves of the forest were (when considered mechanically) natural machinery most wonderfully adapted to the purpose of grasping upon the atmosphere, and thus causing those dynamic changes which induce the precipitation of moisture.

The forests were, in fact, most singularly complicated condensers, and performed their peculiar office in the atmosphere far better than the most skillfully contrived alembic of the chemist.

Forests were shown to be essential to a uniform rain-fall when existing in the proper localities, as determined by the great local meteorological laws.

A knowledge of the path of storms in any locality, and of the topography—the elevations and depressions, the rivers, marshes and lakes—was shown to be essential to any exact estimate of the limit of safety of the cutting of forests. The only way in which the widespread knowledge necessary could be obtained would be by a general system of observation by farmers and others throughout the whole country of the great facts of the local rain-fall, direction of winds, etc., which could be easily done with little trouble.

With these observations, and an accurate system of topographical and forest maps (which every State should have made), it would be possible to make close estimates as to where forests must be preserved, where replanted and where they might be safely cut. To secure this information required the intelligent co-operation of all citizens. The lecturer told of his personal experiences on the mountain peaks of the Adirondacks and Rocky Mountains, and traced the origin of rain from its evaporation by the sun's rays from the sea to its condensation to cloud—and showed how Buy Ballot's law readily enabled meteorologists knowing the path of storms, from a mere knowledge of the present direction of the wind and the area of the last high or low pressure, to determine the probable maximum or minimum liable to follow, and probable change in the direction of the

winds; but that the location of forests greatly modified the exact application of this law, and rendered imperative that we should study the path of storms on exact topographical maps showing the location of forests, and that then only should we be able to make exact predictions.

The important part which trees play in absorbing pollution from the soil is set forth in the following paper, read at the Montreal meeting:—

THE COPPICE FOR THE VILLAGE AND THE FARM.

By Mr. M. C. Read, Hudson, O.

Tree culture serves many purposes besides the production of timber. In fact the climatic and other influences affecting the agricultural interests are the most important considerations for the planting of forest trees not designed merely for shade or ornament.

In village planting, trees can be only sparingly used in the immediate neighbourhood of the dwellings. The same is true of farm-house planting, abundance of sunlight and the free circulation of air are indispensable, which is seriously interferred with by the thick planting sometimes, and too often practiced. A smoothly shaven well-kept lawn is the crowning beauty of a park or village lot. A dense shade makes this impossible, and in all cases it is a difficult, and in many seasons a hopeless undertaking where there is not an abundant supply of water available for frequent sprinkling. This is an indispensable requisite, the want of which will prevent the dweller on the farm or in the village, from enjoying the well-kept grounds which should characterize city residences. After doing what they can in this respect the residents of the village and the country should resort to a mode of planting adjusted to their condition, and this mode is best found in the coppice, a forest in miniature, which, when once established, will take care of itself. On almost every village lot there is some nook or corner in the rear on which such a plantation could be made, into which trees and shrubs should be crowded, without order, in such numbers as will prevent the growth of grass beneath them, with such a mixture of creepers, vines and low growing herbaceous plants, that a dense thicket will be quickly formed, almost impenetrable to man or beast. The beauty of such a thicket will consist in its native untamed wildness, and, if adjacent to a well kept lawn, the two, like two complementary colours brought together, will each enhance the beauty of the other.

The cost of planting such a coppice is trifling, to secure the best results the ground should be well prepared in the fall. Fertilizers added, if needed, and, in the early spring, covered to the depth of three or four inches with leaf mould from the woods. The number of seedling trees, shoots and native flowering plants which will spring up from this dressing will surprise one who has not tried the experiment. For the main planting take the most easily obtained trees and shrubs from the nearest forest. Multitudes of seedlings from four to ten feet high can be gathered, which, without digging, can be pulled up by the roots. By selecting them in that manner, those without large tap roots, the surface feeders will be gathered, and those most readily bear transplanting. As many flowering shrubs, and as many that produce berries edible by the birds as practicable, should be selected. To these should be added our native Clematis, the Virginia Creeper (Clematis Virginia), the Ctaff tree (Celastrus scandens), the frost grape, and as many farm and forest plants as can be readily obtained. For some time this coppice should be a kind of "Botany Bay," to which should be sent every ornamental shrub or flowering plant not needed in the well-kept parts of the grounds.

If, in laying out village plats, ten to forty or more square rods were reserved in the centre of every block, upon which the rear of all the lots of the block would abut, to be planted with such a coppice, it would secure the presence of a multitude of our small insect eating birds, and be of immense value in the immediate sanitary results. The soil of almost every village becomes so polluted from household offal as to literally poison the water of nearly all the wells. Arrangements are almost always made to drain this offal

towards the rear of the lot, where it is generally permitted to soak into the earth. If drained into the central coppice of the block, it would secure a rank and luxuriant growth, which would substantially absorb and neutralize this poisonous drainage. The village would be clothed with grass, which would need no care, which during all the summer months would be vocal with the songs of the birds and which would do more than any sanitary board is likely to do to secure the health of the citizens.

Almost every farm has patches of waste land, only needing enough care to prevent the intrusion of domestic animals, to convert them in a few years into such coppices. In very large parts of the country these patches of waste land are so large and numerous that if they were all thus utilized the full climatic influences to be derived from forest culture would be obtained. The beginning of the planting of such coppices in villages and about farm houses would materially tend to a similar appropriation of all the waste patches, cut swamps, and rocky hills upon the farm. In them the strong growing varieties of trees would gradually overshadow the others and ultimately acquire a growth fitting them for use for timber. But the main advantages would be climatic and sanitary. Every such coppice would discharge the functions of a forest, which isolated trees and wind-breaks do not do. All the rain falling upon them would be absorbed by the earth (or sent back to the air by evaporation) and sinking downwards until impervious strata were reached, would then flow away to become in the aggregate the sources of springs.

In the village the sanitary influence would be of the first importance. The difficulties in the way of the safe distribution of household offal are not fully appreciated. In a small village where there is an efficient board of health and where much more than ordinary care is taken to guard against the pollution of the soil, I have this summer made chemical tests of the water from forty-seven wells taken in consecutive order. All but four of them gave unmistakable evidence of defilement from kitchen slops or human excreta. If the house drainage of each lot could be carried by cemented pipes into such a coppice into the centre of each block, the rank growth of vegetation then induced would absorb and neutralize this poison and accomplish much toward the solution of a very serious and difficult problem. In such a coppice of four square rods the accumulation of night soil of an ordinary family, if properly composted, may be safely spread upon the surface to be rendered innoxious by oxidization or to be appropriated by the growing vegetation. If the kitchen drain came to the surface in it, the deleterious influence of the kitchen slops would probably be fully neutralized. When drainage to a water-course cannot be secured such a termination of the kitchen drain is the best practicable.

The following paper has a general bearing upon the whole subject from a Canadian stand-point, and has been prepared by a well known Canadian:—

FORESTRY IN CANADA.

By A. T. Drummond, Montreal.

Perhaps no trade question has around it at the present time so much interest as that of the conservation of our forests with a view to the continuance of the lumber industry. This industry has once more revived, and very large demands are now being made on our lumber supplies. Public attention cannot, however, be too strongly directed to the fact that these timber supplies are not unlimited. The drain which has been going on for thirty years past on the resources of our forests, has been so vast and so continued that the questions are now being forced on us—for how long a time CAN these resources be depended on, and what efforts are being made to provide for that supply being continuous? It is perfectly clear that under the present system of farming out the public lands, the time is near at hand when the supply of merchantable standing timber will not equal the demands made upon it, and it is imperative that means should at once be adopted to preserve and recuperate these timber lands. Those who are familiar with the localities—each year extending farther northward and westward—where the lumbermen obtain their logs, cannot be blind to the fact that the area in which the pine may be expected to be

found of merchantable size and in fair abundance, is not so extensive but that another few years of working the timber limits to the extent done in the past, must result in a marked diminution in our exports of white pine. It is not with timber as with other agricultural products. Reproduction cannot take place in a year or a decade. It must be recollected that not until the pine is from seventy-five to one hundred years old is it of good merchantable size for square timber, and that thus at least three-quarters of a century would be required to make these timber limits what they were. And what has been the experience in Maine and Michigan? The pine forests of both these States were thought to be inexhaustible, and gave employment to many thousands of men. Bangor, on the Penobscot, was one of the busiest spots in New England—so many mills lined the river banks, and so many vessels frequented the port for lumber. Now the scene is largely changed. The pine lumber manufactured there has fallen from 102,000,000 ft. in 1856 to 63,000,000 ft. in 1866, and to 14,000,000 ft. in 1877, whilst the total production of pine, spruce, and hemlock boards was not in 1877 one-half in amount what it was in 1866. Again, in Michigan, the Saginaw Valley is being rapidly depleted, and to supplement the supply to its numerous mills, whose capacity is 600,000,000 ft., logs have to be brought from other large rivers long distances away. But most important of all is the fact that the lumber journals of the Western States admit that in the three States of Michigan, Wisconsin and Minnesota—the main sources of lumber supply in the West—there does not, with the present demand, remain of standing pine timber sufficient for ten years to come.

Even greater destruction has resulted from forest fires, not only by reason of the immense areas through which the fires sweep, but because both large and small trees are alike destroyed. Another incidental but most important result arises from the fact that after forest fires, the first growth always consists of poplar, birch and other trees, though whether the pine, which is of slower growth, gradually in the course of long years, asserts its position and overshadowing these, in turn replaces them, is a question which observation has not yet had time to settle.

Tree planting has not yet impressed itself on the people of Ontario and Quebec as an idea necessary to carry out. Hitherto, the ambition of most farmers appears to have been to clear the land as soon as possible, and to be content if enough of wood suitable for fuel and farm use is left. Whilst lumber was cheap and the supply appeared almost inexhaustible, it would not appear necessary to most land owners to provide for the future. Besides, men are selfish, and are disinclined to go to labour and expense in regard to what does not promise immediate results, the advantage of which they will not themselves reap. And yet if we revert to the condition of the Ontario peninsula, as it was fifty years ago, abounding in splendid walnut, whitewood, pine and oak trees, nearly all of which have been cut down long since, and when we remember the greatly increased value which, especially walnut, lumber now has, we cannot help seeing of what immense benefit to the rising generation it would be had the trees, as cut down, been at once replaced by young trees of the same species. Already many of these young trees would have been of fair marketable size. The Maine Board of Agriculture in a memorial presented to the State Legislature, very pointedly refers to the duties of individuals on this question. "Men need to be taught," says the memorial, "that we have no moral right to follow blindly an instinct that leads only to present personal advantage, regardless of widespread future evils as a consequence; that we are but tenants of this earth, not owners in perpetuity; and that we have no right to injure the inheritance of those who succeed us, but rather a duty to leave it better for our having occupied it the allotted time. Men need to be taught to plant trees and their children to plant and love them. Owners of good lands in Maine or elsewhere will in the future learn that their bleak fields, if judiciously planted with wood to the extent of 40 per cent. of area, will produce on the remaining 60 per cent. more in all kinds of crops than the whole does now or can be made to do under any other possible course of treatment. Lands well sheltered can and do produce winter wheat in Maine as well as in New England or on the new lands at the West." In accordance with this memorial, the State Legislature provided for exemption for twenty years from taxation of all cleared lands on which forest trees had been successfully cultivated for three years, and maintained in a thriving condition thereafter. Nearly all of

the Northern and Western United States have in this way statutes to encourage the planting and growth of timber trees, and the effect of encouragement in this respect has in the Western States been most valuable.

Prof. Sargent, of Harvard University, tells us that "as moderators of the extremes of heat and cold, the benefits derived from extensive forests are undoubted, and that our climate is gradually changing through their destruction, is apparent to the most casual observer. Our springs are later : our summers are drier, and every year becoming more so ; our autumns are carried forward into winter, while our winter climate is subject to far greater changes of temperature than formerly. The total average of snowfall is perhaps as great as ever, but it is certainly less regular and covers the ground for a shorter period than formerly. Twenty years ago peaches were a profitable crop in Massachusetts; now we must depend on New Jersey and Delaware for our supply ; and our apples and other orchard fruits now come from beyond the limits of New England. The failure of these and other crops in the older States is generally ascribed to the exhaustion of the soil ; but with greater reason it can be referred to the destruction of the forests which sheltered us from the cold winds of the north and west, and which, keeping the soil under their shade cool in summer and warm in winter, acted at once as material barriers, and reservoirs of moisture."

The influence of belts of trees on local climate is, in fact, very marked. They form obstructions to and ward off, on the one hand, the cold winds from the north which would lower the temperature and, on the other hand, the parching winds which would unduly raise the temperature and equally injure vegetation ; they break the effects of storms, and in the winter time cause the snow to be equally distributed over the fields, forming thus a uniform protective covering to the ground ; and if generally distributed over the western prairies they will promote the more equal distribution of the rainfall, and will prevent the streams from being dried up, as they usually become after midsummer. Observing agriculturists have found that fields protected by belts of trees yield crops much more prolific than those not so sheltered.

In our timber regions the replanting of the pines can be to some extent left to nature, but there is every reason, since the timber limits belong to the Government, and a large annual revenue is derived from them, why the Government should, especially in the lands which have been burned over by forest fires, institute a regular system of tree planting. There is all the greater reason for this because of the fact that, after a forest fire, trees of different species from those which were previously there, usually spring up. The expense would be comparatively trifling, and certainly insignificant, when placed beside the results which posterity would derive from it. To individuals there may seem little inducement to plant pineries which may not be available to the fullest extent for towards three-quarters of a century, but Governments can have no such feeling, considering that what would be done by them would be for the future benefit of the country and a source of revenue in that future as well. What the Governments can and should also do is to, as far as possible, by legislation and the insertion of clauses in their leases of timber limits, prevent the occurence of forest fires and preserve the younger trees from injury at the hands of the lumbermen. The experience which we are yearly realizing of gradually diminishing areas of timber supply and the now nearly exhausted condition of the United States pineries, make this matter a subject of pressing national importance which, if our legislatures do not now take up, they will probably find twenty years hence that it is too late.

The question of tree planting must arise in our North-West, and the sooner it is grappled with, the better for the welfare of the future millions who are expecting to people the vast prairies west of Winnipeg. In the matter of fuel alone, its importance may be estimated from the fact that there are extensive tracts of western territory where the farmers journey from ten to twenty miles by waggon or sleigh in order to obtain fuel, or where they have to rely solely on the wood train which at intervals supplies them ; and such farmers are often exposed to positive suffering when extensive snow blockades take place. The prairie farmer, indeed, very soon understands the value of a belt of trees on his farm, not merely as a source of fuel and fencing, but even more as a windbreak warding off the fierce blizzards in winter, and in summer sheltering his growing

crops, fruit trees and stock from the strong prairie winds which, developing into storms, cause almost every season vast injury.

It is not at all improbable that the planting of forests on the prairies in Manitoba, Dakota and Iowa, will be the solution of that most embarrassing problem—the grasshoppers—by affording obstructions to the high winds which bring these insects from their habitats farther west, and by furnishing suitable homes for myriads of birds which would keep the increase of the grasshoppers in check.

The planting of forests will also probably solve the question of the successful growth of fruits in Manitoba and the Northwest. Fruit trees need protection alike from storms and from parching winds, and especially in our western prairie country is this necessary. It has been laid down as almost an axiom in the western States, that the forest trees must precede the fruit trees in order to afford such protection.

In Minnesota an earnest effort has been made to encourage the planting of trees. A State Forestry Association has been organized, and annually offers premiums for the largest number of trees planted on a day in May denominated Arbour Day. It is estimated that in the spring of 1877 there were 5,290,000 trees planted in Minnesota, and of these over half a million were put in on Arbour Day. During the entire planting season of that year it is believed that about ten millions of trees were planted, and of these, that about seventy per cent. have lived.

The question of tree planting is one which should be actively taken up at once in our Northwest. The Government of Manitoba could not grapple with a more pressing subject for legislation, unless it be drainage. The greatest drawbacks against which the Northwest has to contend, from an agricultural point of view, are wet lands, scarcity of timber, and liability to high winds, and, in some localities, to summer frosts. Dakota and Minnesota have equally these drawbacks. The Manitoba Legislature has taken up the question of drainage, and active efforts are now being made in some parts of the country to reclaim the wet lands. To cope with storms and frosts seems hopeless, and yet experience has found the great value of belts of trees around each farm as affording effective shields against these. What the Government there should do is to promote Forestry Associations, and to, in every way, encourage tree planting by exemptions from taxation or by direct premiums or bonuses. Any such encouragement successfully followed up will be returned one hundred fold in the larger and more certain crops, the store of wood for lumber and fuel created by the growing timber, the relief from the monotony of the prairie landscape through the belts of trees dotting the scene on every side, and not least, in a more contented and prosperous community of farmers.

The beneficial results obtained by planting rapid growing trees in the prairie districts of the west, are shown in the paper next submitted.

WIND BREAKS ON THE PRAIRIES.

By Suel Foster, Iowa.

To the President and Members of the Forestry Association:

The natural circulation of the air is no doubt very healthful to both man and beast; but like all the great, wise, and good things the Creator has provided for us, an excess is injurious. Too much cold, too much heat, too much rain, too much drouth, too much wind, too much calm have their evil results. It becomes us, industrious and intelligent men, to modify the excesses in all these elements. When the piercing rays of the sun scorch the tender young plants of the nurseryman, he shields them from half these rays, when too cold in winter he covers with earth, or takes them to the cellar or green-house; when too wet he drains, when too dry he waters. All these things should be managed with economy and they should not cost too much.

A line or belt of trees around the dwelling, the barn, stock-yard, garden, or orchard, is a valuable improvement that no home should neglect; one half the situations in a hilly country and in all the prairie are very uncomfortable without trees; besides it looks like

poverty and wretchedness, not only such a home in a small house, but the larger more expensive the house, the more barren and forbidding. Show us an artist who will picture a house on the prairie without trees, and such an artist has poverty of design, has missed his calling, and no one will buy the picture; and the home itself will lack value without trees, many times more than their cost, for its lack both of beauty and comfort.

"Lo, the poor Indian"—Although I was in Iowa before they left, I have never seen the marks on the prairie where they had built a wigwam, or seldom even pitched a tent in the open prairie; but they invariably sought the timber, as do the cattle, to shelter themselves from winter winds. If we will have a law to compel a man to school his children, we should have a section to compel the father to set trees to protect his children from the winds and storms of winter.

Now for the fields.—Experience shows that high winds are injurious to the crops; they often break the leaves of the corn, or slit them into shreds, and the growth and yield of any field crop is perceptibly better where protected by a line of trees, and yet farmers object to the trees taking too much of the land, without knowing that the field will yield more if ten per cent. of it has a belt of trees on the north and west sides. I have never heard of any field crop being injured by too close continement of air by trees; it is thought that this may be the case with orchards. Then trim up the trees at the bottom and thus give half the force of wind. Far more orchards are injured by too much wind than by too little.

Our western farmers now almost entirely use *barbed wire* for new fences, and repair of old ones. The osage hedge was generally set for fences five to twenty-five years ago, which needed no fence-posts; and the farmers neglected planting wood for that purpose, hence a good portion of the thrifty young oaks that cover the bluff lands and groves about the streams of water, have been allowed to grow up until they are ten to fifteen inches in diameter, making good posts. But there is a large proportion of farmers in this prairie country who have no post-timber grove to cut from. They have now come to the time when they begin to say:—"If we had planted post-timber twenty years ago, we should now have a supply of posts."

What shall we plant?—First I would say to the new settler on the frontier, plant the white willow, for the ease of producing trees quickly, by sticking cuttings and stakes into the ground. It answers for fuel, and for fence, for wind break, for a *live tree* fence-post to nail the piles to, or to support the barbed wire. Next have a strip of land ploughed one year, and the next year set a belt of four or more rows four feet apart of Western or Hardy Catalpa on the north and west sides of the farm. It is a safe tree in transplanting, of very rapid growth, and we have abundant evidence, from undoubted authority, of its great durability for posts, sills, bridge-timber, railroad ties. My experience with it, for more than twenty years, fully satisfies me that it is the most valuable tree for the farmers of the Northwest, and all the states where timber planting is done. Although we are a fast people, we have moved very slow in getting the catalpa introduced. BUT WE HAVE DONE IT. A catalpa of my own raising, twenty-two years old, which has had hard usage, having been transplanted three times, was cut last winter, it was fourteen inches in diameter. A writing-desk made from it is very beautiful. Let me step out now and measure some trees I have that are six years from seed. They are six to nine inches in diameter, and twenty to twenty-eight feet high. The best tree in the row of eight was cut off with the axe when two years old, and in four years it has grown seven inches in diameter, and twenty-four feet high. The best way to transplant catalpa, is to cut them off if they are either one, two, or more years old, and set out the root with a short stump. I will this year take roots, one, two, and three years, with the stock cut off, and drop them in the furrow like potatoes, and then cover with the plough. This quality of tree can be had now of nurserymen at $7 to $30 per 1,000 [and for a great deal less, yearlings, first-class $7; second-class for $3.50 per 1,000.—ED.]

When catalpa trees are cut off near the ground they start several shoots, which should all be picked off but one, and when treated in this way they make straight handsome trees for the lawn, blooming early in June (the Southern Catalpa blooms two or three weeks later, and cannot hybridise), the great bunches of large white flowers among the luxuriant

green leaves, intermixing the white and green through the tree-top, like snow on a leafy tree in early autumn, make it a thing of rare beauty.

I might weary your patience by continuing this paper on many other varieties, but the two, willow and catalpa, make a very short list, always taking the best at the same cost, and the difference one to three cents of first cost is repaid more than 100 per cent. a year in culture and growth for the next ten years.

The beneficial effects of shelter-belts between farms and across townships are well set forth in the paper which follows.

TREE PLANTING IN SHELTER-BELTS.

By Dr. John A. Warder, of North Bend, Ohio.

For many years past, upon all suitable occasions, earnest and practical tree-planters of the prairie states have been advocating the introduction of this mode of planting trees. They have urged it persistently by writing and by talking, but better still, and still more eloquently and more convincingly, by the practice of the dogmas they have presented. The arguments of a well-grown shelter-belt on the prairie in a windy winter's day cannot be gainsaid by the most obdurate doubter.

When exposed to the fierce prairie winds it would be well enough to call them by the title of prairie zephyrs, and if sheltered from them by the kindly interposition of a well-grown wind-break of evergreens, or even of deciduous trees, the benefit and the effect upon the local climate cannot be gainsaid. After such a test no one can any longer question the validity of the claim that forests do modify the climate. The fact being demonstrated by the *argumentum ad hominem*, the discussion must end.

But more sensitive, more delicate, and much more accurate tests have been applied, and the effects have been demonstrated by plants themselves, very many of which can now be successfully produced if planted in the same soils, yes, even in the identical stations, where they proved tender, and miserably failed, when planted in the open prairie lands, without these shelter protectors a few short years ago. The more delicate and convincing proofs have been furnished by the use of instruments of precision applied to the solution of this question; their answers have been carefully noted and recorded during continuous years at many forest-stations in Europe, some of these being located in the forests, others in the open lands similarly situated as to soil, exposure, elevation, and alike in all other respects, except the protection of the trees. The results carefully collated and published have demonstrated that the humidity of forest lands is greater. and that the temperature is sensibly moderated—the woods are cooler in the summer and warmer in the winter, thus confirming what every one must have noticed by the test of his own sensations.

Now that which has been found to be so essential on the prairie, and to yield such happy results, in the increased certainty of all agricultural productions, in those vast regions of agricultural lands that are being brought under the dominion of the plow, in the great central portion of the continent which has heretofore been familiarly known as *The West*, must be acknowledged to be a matter of *national importance*.

This truth is appreciated by far-seeing minds, and we have recently had the satisfaction of reading in a recent metropolitan journal an article which has great significance. It being conceded by all intelligent observers that trees and woods do modify the climate in the localities where they exist, and as it is well known their absence in the broad region of open lands that lie beyond the Father of Waters—that part of our continent now has an arid climate—often seriously affects agricultural productions and sometimes utterly destroying the farmer's anticipated harvest, why may we not hope and reasonably expect to see portions, at least, of that large area between the Missouri and the Rocky Mountains reclaimed to agriculture by the judicious planting of forest trees?

Twenty years ago such a proposition was made, and plans were suggested for planting groves on alternate sections entirely across these treeless plains, to demonstrate the

practicability of their production and their great utility, as well as to encourage private enterprise by setting the example.

In a late number of the New York *Evening Post*, these two postulates were set forth by the editor, a man who has correct views respecting the principles of forestry, and who appreciates the national importance of this branch of agriculture. He lays it down :—

(1) "The *East* cannot flourish while the *West* suffers from the occasional drouths," and,

(2) "*The prosperity of the West will depend upon Forest growth.*"

These two propositions are both true, and their serious consideration is worthy the attention of the economist and the statesman. But how shall those forests be produced in sufficient number and to a sufficient extent to be of general benefit? That is a problem yet to be solved. The United States Government has encouraged planting by individual effort in passing the "Timber Act," which gives a farm on the public domain to every settler who will plant a portion of it with trees. This is well and will result in the extension of woodlands. The great railroad corporations begin to plant trees upon the principalities of lands granted them as subsidies by the Government. It is but right that they should do this work, and it will enhance the value of the lands they hold for sale, while the woodlands are producing the supplies of cross-ties, the fuel, and the lumber, for their own and for others' use; and during all the time they stand, these artificial forests will have exerted a most happy influence upon the climate.

All this may be admitted by some who are more happily situated among the remnants of the ancient woodlands. But are not we also already in danger? We of the naturally timbered regions of the continent, especially those of us whose lands stretch off to the northward and westward of the Alleghanies, forming broad fertile plains that are not broken and mountainous, but level and altogether arable? These lands were heavily timbered when in a state of nature, but in a brief space we have removed these encumbrances, and have appropriated these fertile plains to agriculture. We are still rapidly progressing with this change, and are aided in the work by the wonderfully increasing demand upon the products that is created by the extention of the various manufactures that require wood.

Now, it may well be asked, Are we not in danger of carrying on this work to its extreme limit, and shall we not suffer thereby? That is a momentous question, and one which demands our most serious attention.

Meanwhile, we have something to offer as a substitute for the forest, to those of our fellow citizens who do not feel prepared to plant timber trees extensively and as a crop, more or less extensively, as it is done in thousands of instances by the land-owners of Europe. We offer this plan to those who feel that they cannot spare a single field from the plans and shedules they have laid down for a regular rotation of corn, oats, wheat, and clover, or meadow lands—and also to those who may have on their farms no rocky ledges, no ravines, no steep hill-sides, no odd waste corners, nor overflowed lands, upon which they might advantageously plant trees. They are not asked to give up a single field and turn it into woodland; but even they who are so happily situated as to the cultivable character of their lands may yet find it greatly to their advantage to plant trees in the manner which is now to be explained. It will be all the more desirable that they should do so, if their farms be surrounded on all sides by other lands equally well adapted to arable crops, and equally free from the waste places so often found on many farms, and which are almost utterly profitless, though always counted in as so many acres by the assessors in making up the tax duplicate.

In such a territory of fertile champaign country, where every farmer in a wide neighbourhood is similarly inclined to crop his whole farm, and where each desires to reap the golden harvest from every acre of which he may be possessed—just there is the great danger of our finding out some of these days that we have too much cleared land in contiguous tracts; just there are we liable practically to turn our woodland into prairie—and in many parts of the country we are rapidly reaching such a consummation.

Just there, too, is the place at once to institute means that shall obviate the danger which threatens. This is not to be done by relegating a single one of these beautiful

farms back to forest growths. No one shall lose anything by cruel edict, but each for himself, and all collectively, are promised the full fruition of the benefits that will accrue to those who accept the advice and adopt the plan, which *consists in a system of tree belts across the whole township, and across or between the several farms.*

These shelter-belts and wind-breaks, though occupying a portion of the land, will add materially to the productiveness of the soil that is retained in cultivation, and they will in no small degree modify the local climate, which an extreme amount of clearing has already affected by the exposure of such broad contiguous surfaces to the influence of the scorching sunshine, and to the drying and blasting winds.

On the broad and open expanse of surface of the treeless plains of Iowa, where in the northwestern half of the State there is but one acre of woodland to a mile square of 640 acres, these shelter belts have been fairly tried by those who were bold enough to settle in such exposure. Among them Mr. C. E. Whiting has been one of the first and the most extensive planter of trees upon this plan, and for the purpose of modifying the local climate, and in this he has been successful. Mr. Whiting declares that he can well afford to plant the trees and to give up the land they occupy, for, independently of the fuel they already yield him, and the wood for many economical purposes upon his farm, the remaining four-fifths of the land still occupied by his crops will yield him better returns than the whole area would have done if it were all cultivated to the extreme outer boundaries, but exposed to the elements, and not thus protected by these artificial *shelter-belts.*

This kind of tree planting serves the double purpose of replacing the forests which have been destroyed and of modifying the climate. First—it produces wood for fuel and lumber. Second—it also modifies the climate.

These shelter-belts are particularly adapted to level tracts of fertile lands devoted to agriculture, and the broader the area of such lands the greater becomes the necessity for their protection in this way, just as they are needed in the prairie regions.

The planting of these shelters does not supercede the necessity of tree planting also on the waste places, ravines, and corners, where they exist ; by all means, let that good work also be done, to supplement the belts in our efforts to replace a proper proportion of the forests we have destroyed.

Here, as elsewhere, in all our artificial forestation, planting directed by human brains is better, and the results will be more satisfactory, than trusting to natural reproduction, for it enables us to do the work more thoroughly, more evenly, and more judiciously, since we can make a selection of the species best adapted to our soils, and best fitted to our necessities, whether for their sheltering effects or for their ultimate wood products.

If, as of necessity on the prairies, you desire to produce an immediate effect in the shelter, you can be gratified by planting the trees of most rapid growth, even though they be of inferior quality. The outer rows of the wind-break may be set with these kinds, and next to them may be placed those of slower growth, whether deciduous or evergreen. Or you may have the effect you desire at first, and better trees afterward, by planting intermediately such as will be coming on more slowly to take the place of the fast growers when they are removed. This will be true of oaks and hickories, or walnuts, planted among poplars and other rapidly growing kinds.

The evergreens should not be mixed with deciduous trees either in the belts or in the groves, but they should always be massed by themselves and planted in separate rows, if we desire them to succeed. In some cases it may be desired to use the evergreens exclusively ; and for mere shelter, particulaly in winter, they are exceedingly effective, and a double or quadruple belt will yield more shelter if set with Norway spruce, or some of the pines, than ten rows of almost any of the deciduous class.

The preparation of the land for the shelter-belt should be as thorough as for a crop of grain, and done, of course, with the plow and harrow. Furrows or marks are made at intervals of four feet to receive the plants, which may be set closely as in other plantations, especially as we desire to break the force of the winds as soon as possible.

A single row of trees, especially if they be of evergreen species, will yield a comfortable shelter, but to be effective, and in exposed situations, several rows should be planted occupying a strip of from four to eight rods in width.

The cultivation should be thorough to encourage the rapid and healthy growth of the

young trees, and it should be continued until the plants entirely shade the ground—a varying period, depending upon the character of the trees, and in part upon the breadth of the foliage.

Until the trees have attained sufficient size to protect themselves, it will be necessary to exclude all domestic animals—or, indeed, these should never be admitted to the plantations.

The following papers refer to the proper care of forests, and the conditions which favour their healthy development.

THE PRESERVATION OF FORESTS FROM WANTON DESTRUCTION, AND TREE PLANTING.

By Mr. John Dougall, Editor of the "New York Witness."

The greater part of the North American continent was covered with forests when first invaded by Europeans. These forests had stood for many ages undisturbed, except by the slow decay of one generation of trees, if we may so speak, and the slow growth of another. These operations had been going on simultaneously since the creation, or since the last great convulsion of nature, and the annual falling of leaves and the gradual decay of branches and trunks had covered the earth with a vegetable mould of considerable depth.

A UNIVERSAL MINE OF WEALTH.

This mould, possessing all the elements of fertility, was an immense treasure, everywhere abounding, and tempting the settler to clear away the trees and reap the benefit of the virgin soil. When trees were cut down, a crop, which had probably required several hundred years to grow, was reaped in a few weeks or years, thereby leaving the earth bare, and the vegetable mould was used up by continued cropping in wheat, corn, and potatoes. The writer knew an excellent bush lot which produced great crops at first, to be reduced in less than ten years to mere rocks and stones. And this process of exhausting the vegetable soil went on everywhere as fast as settlements advanced. Of course where the subsoil was good and was turned up in part to mix with the vegetable mould fertility continued much longer, but, in course of time, all, except prairie lands, were reduced so much in fertility as to require the application of fertilizers at great expense. Had the soil at first required these fertilizers the progress of settlement would have been exceedingly slow, or more probably there would have been no progress at all.

WAR AGAINST TREES AND ITS EFFECTS.

The labour of cutting down great trees, cutting them into short logs, and piling them up in log heaps to burn, was however, so great, that a feeling of dislike to trees as the settler's natural enemy became general, and the vengeance against them was so great that in extensive regions the land was completely bared, and thus rendered not only unsightly but unsheltered. Bleak winds had full play and droughts parched the earth. What was even worse, the clearing away of trees on the hills and mountains by the settlers, the lumbermen, and forest fires left the snow of winter exposed to the spring sun; and the sudden melting and running off of this accumulation of frozen water made dangerous floods in the streams in early summer, and left those streams nearly dry in the hot season.

CALLING A HALT.

At length the evil results of the indiscriminate cutting down of trees began to be perceived. The improvidence of previous generations was lamented, and efforts to conserve what forests were left and to plant trees gradually became popular. The first class of efforts was directed to preserving a few acres of the original forest in each farm where that still could be done, and merely thinning the trees for firewood, fencing, etc., thus leaving

the smaller trees to grow more rapidly. The grove thus preserved became one of the most necessary and valuable portions of the farm, and that without any labour of ploughing, sowing, or cultivating. It also afforded a delightful shade in hot weather for man and beast.

FORESTS IN THE TERRITORIES.

The preservation of the vast forests in the Territories belonging to the nation attracted attention also, and laws were enacted to protect them from wanton waste. Secretary of the Interior Schurz distinguished himself for endeavouring to enforce these laws, which are very difficult of execution on account of the opportunities lumbermen have in an almost uninhabited region for cutting trees on Government land, and the frequency of forest fires kindled by careless Indians, hunters, trappers, lumbermen, and settlers. These fires often do more damage to forests in a few days than lumbermen could do in as many years, and how to prevent them is yet an unsolved problem.

FORESTRY LAWS.

The only remedy, and that only a partial one, that can be suggested, for the wanton destruction of forests is a national system of Forestry laws, somewhat similar to those of France, Germany, Austria, Norway, and other European countries, which prohibit under severe penalties the injury or destruction of trees by unauthorized persons; and also the kindling of fires or even smoking in the woods. A forest police was created to see to the execution of these laws, and at the same time providing for the utilizing of forests by gradually thinning out and selling the largest trees, so as to leave more room for the smaller ones. In this way the public forests are an annual source of revenue, and after centuries of such management they are in as good condition as they were at first.

JUDICIOUS THINNING.

In passing through Plattsburgh, N.Y., once, the writer saw the Saranac thickly covered with sawed lumber, and he asked an old gentleman if that river was not yet lumbered out. The reply was "I have known it for sixty years, and the quantity of lumber coming down has been pretty much the same all the time. There is as much now as there was sixty years ago." This shows the result of a judicious system of thinning forests.

A COMMISSIONER OF WOODS AND FORESTS.

If the United States and each state had a department of woods and forests with a suitable head and necessary subordinates, much could be done, not only for the preservation of forests belonging to the public, but to persuade settlers to leave a suitable portion of their farms in wood; and to counsel from time to time in public documents, not only care in husbanding present forests, but some general system of tree planting by states, corporations, and individuals, so as to provide a supply of timber for the future.

TREE PLANTING.

The second branch of this great subject is tree planting, and here credit must be given to the U.S. Government for its encouragement of this necessary work in the prairies. The law giving 160 acres to anyone who will plant and maintain for a few years forty acres of trees, has had a great effect already in providing for a future supply of timber in the Prairie States; those groves will also break the terrible prairie blizzards, and, probably, to some extent, attract rain-clouds to mitigate prairie droughts. A fine spirit of tree planting has also been manifested in many cities and villages; and "Arbour Day," or a day set apart in spring for tree-planting, has become, in some parts of the country, an institution for the purpose of beautifying streets and public and private grounds.

PLANTING TREES ON PUBLIC ROAD-SIDES.

The public roads should be lined on each side with trees, which, when grown, would do something towards sheltering and beautifying the country everywhere; but along rail-

roads there should be something more than isolated trees. There should be a rather broad belt on the windy side, thickly planted with the various kinds of trees needed for repairing the roads. This belt would shelter the railway from storms, catch and retain the winter's snow which gives us so much trouble, and before many years supply much useful timber when the supply from other sources might be exhausted.

TREE-PLANTING ON FARMS.

Every farm should have a belt of timber planted all along its windy side, this belt, not less than fifty feet wide, should be planted thickly with the various kinds of trees that grow best and fastest in the neighbourhood, the thinning of which for useful purposes would soon be valuable, whilst the shelter it would give from prevailing winds would be invaluable. All swamps not covered with trees should be planted with white, and red cedar and tamarac, all of which grow best in damp ground, and produce most excellent timber for various purposes. The leaves also of these trees would absorb the unwholesome air which swamps generate.

STONY GROUND.

There is on many farms more or less of ground so rocky that it will not repay the expense of cultivation, and all such spots should be planted with trees. These may be got out of the woods or farm nurseries ; or what would be easier, cheaper, and probably much more effectual, the seeds of various kinds of trees could be sown, imitating as nearly as possible the natural processes which have produced all the forests of the country. The seeds of different trees should be gathered in the woods just at the time that they fall naturally, and they should be immediately planted in little shallow holes among the stones, and covered with a little earth. There the rains of autumn, the snows of winter, and the sunshine of spring would bring up quite a crop of young trees, which should be fenced in from cattle and left to themselves. They would require no labour after the first sowing and fencing except subsequent thinning out from year to year of those that were too crowded or most valuable for economic purposes. If hickory nuts, black walnuts, butternuts, chestnuts, and the seeds of sugar maples, pines and spruces were any of them or all of them sown every here and there over the place intended for a grove the most valuable kinds and those that thrive best could be ultimately left to become great trees. After ten years the annual thinning of this grove for firewood, fencing, hop-poles, railway-ties, etc., would probably make it as valuable a part of the farm as any other, and when the black walnut and butternut trees became large enough to be sold to cabinetmakers the value of the grove would be very great. The present race of farmers may say they would not live to see the trees become fit for the cabinetmakers, but none the less would the growth of that grove increase the value of the farm every year, and that whether the owner sold it or left it to his children.

A FORESTRY COMMISSIONER.

What is very much needed as a preliminary to covering of a considerable portion of land with these groves is the advice of scientists and experts as to the kinds of trees suitable for different soils, the rapidity of their growth and the relative value of their wood. This information could be collected and scattered by the judicious commissioner of woods and forests in each state, just as the fish commissioner gives information about fishes. To plant or sow millions of trees is just as necessary as to hatch and distribute millions of food fishes.

THE DOMINION.

With respect to the Dominion of Canada there is great need for tree planting in the fertile valley of the St. Lawrence for a considerable distance around Montreal, and still more need in the prairies of the north-west. In the latter region of vast capabilities, to which much attention is now turned, a system of granting land on condition of planting trees might be most advantageously introduced now, as every year will render such an

arrangement more difficult. The other Provinces of the Dominion are still well supplied with timber, and the system of selling "timber limits" to lumbermen is conservative to the forests, but there is need of great precaution against forest fires or wasteful uses of valuable timber. A capable commissioner of woods and forests for the Dominion would therefore prove a very valuable functionary, if he were not only an expert, but an enthusiast in forestry, as otherwise his appointment would merely add another salary to the expenses of Government.

Mr. THISTLE, Pembroke, suggested that the forest rangers, whose work cease in the spring, should hereafter be employed during the summer in an attempt to preserve the woods from fires.

Mr. E. B. COWPER, Crown Lands Department, Toronto, did not think the time had come when the planting of forest was a practicable question for Ontario or Quebec. Clearing must go on.

Mr. LITTLE, said too much, perhaps, had been made of planting as compared with the preservation of forests, which was of infinitely more importance. He had seen splendid pine destroyed for the sake of clearing land in Florida, which would only grow fifteen bushels of corn to the acre. He scarcely thought that was right. It was like flying in the face of providence.

CONDITIONS OF FOREST GROWTH.

By BERNHARD E. FERNOW, SLATINGTON, PA.

To clearly understand and devise methods of forest management, and to forsee the results of such, it is primarily essential that the natural conditions of forest growth be first well understood; that the principles be first recognized on which rest forest production. This is the more important, as forestal operations extend over long periods of time, and the results and effects thereof are often recognized only when the growth of many years has been irretrievably injured, thus inflicting a heavy financial loss on the economy.

In this paper the endeavour has been not to produce anything new and original, but rather to so arrange the known facts of the natural sciences which contribute to the understanding of the conditions of plant growth, that they may easily be applied to the study of forest reproduction, a subject important before all to us at this present moment.

As the idea connected with the term "forest" is vague and undefined, I am desirous before I proceed to clear the conception of what *may* or *ought* to be called a forest. When we speak of a forest in connection with the science of forestry, we do not mean a mere collection of trees, a wood or a park, a plantation, but an aggregate of trees or woodlands which are intended and so set aside for the production of timber or lumber. If we speak of planting and cultivating forests, we do not mean the laying out of parks or groves, which have a very different object in view, which present very different conditions of tree growth, and require in consequence very different methods of culture. Forestry has nothing to do with the planting of fruit or ornamental trees, nor indeed with single trees —just as agriculture does not consider the individual wheat plant. The object of forestry is a financial effect, which is represented by the highest rent from the soil through the cultivation of the same for timber growth.

Of the factors which condition forest growth the soil presents itself first to our consideration.

The soil forms the standing place of the forest tree, as it does that of the wheat plant. But this similar use of the same factor must not induce us to assume too close a resemblance between agricultural and forestal conditions of growth.

It is natural that since agriculture and forestry have both to do with the products of the soil they should be compared with each other, and the principles which govern the one are often mistakenly applied to the other. The difference in these two branches of economy is not merely one of financial import. Though both these sciences—or arts if you prefer the term—have to deal with the products of the soil, this factor takes a very

different part in each. The writer has seen numerous statements in books, papers and journals in this country, pointing out the necessity of a change in species in renovating a forest, thus applying the rules accepted in agriculture on the authority of Liebeg, for the rotation of crops. Anyone who has had to do with forestry, however, will know that not only is the same species of tree propagated on the same place for centuries, but that, at least with some species, the production increases the longer they are propagated on the same ground. That the foliage falling every year and accumulating does in a degree replace the manuring and plowing practiced in agriculture, is not the only cause why the same species can grow and be reproduced on the same place for a thousand years, as is the case with extensive beech, fir and spruce forests in Germany. From this experience it would appear that the system of rotation which we see the farmer deems it necessary to apply in the tillage and manuring of his soil, is unnecessary to the forester.

We shall at once see the reason when we consider the aims of the two.

The farmer's manipulations tend to increase the soluble inorganic elements of the soil, in order to get the highest yield from his field. He applies his energy to produce the greatest amount of protein compounds and with these to remove the maximum of sulphur and phosphorus. He does not pretend, as does the forester, to raise plants in their natural condition, but only such as have been brought by a continued cultivation to an abnormal state, developing one part to the detriment of another. In Asia, the native country of the wheat, our cereals do not differ in their habitus from the common grass. In Chili, in its native state the potato produces bulbs not larger than a pea, and according to Darwin the yield of one acre would not suffice to sustain for one year the life of one Irish family. It is the *abnormal* abstraction from the soil of such enormous quantities of mineral constituents for the formation of amylon, gluten, dextrin, sugars, etc., which necessitates the replacing, in the form of manure of these elements, which are taken from the soil with the reaping of the grain, or, since the different plants abstract different quantities and qualities of the different inorganic elements from the soil, calls for a rotation of plants.

The experiments of Pollstorffe Wiegman have beyond doubt demonstrated that the inorganic bases of the soil form an essential factor for the development of all vegetable life, and the quantities of the same, as found in the ashes of different plants, may be considered as indicating the amount of these materials needed for their full development. We have said that plants differ in the quantity and in the kind of their mineral ingredients very greatly, some of these existing in large quantities and in every soil, others almost entirely lacking in many and only found in small quantities in others.

Now to make a proportional comparison of plants with regard to the impoverishment of soil, which they severally produce, it is import to determine the kinds and amounts of mineral bases each plant requires. A few results from many analyses by good authorities on this point may suffice to show the position of forestry to this question.

Whilst the percentum of inorganic bases in all kinds of wood scarcely ever exceeds three per cent. and mostly remains below one per cent. of the dry substances, we find the ashes from hay six per cent., wheat and rye straw a little over four per cent., and that from oat chaff not less than eighteen per cent. The farmers reap grain and straw, while the forester, if he consults his own interests, allows twigs and leaves, which contain the greatest part of the inorganic constituents of the tree, to remain on the ground.

If we compare the amount of mineral substances which are severally removed by a field crop and a timber-growth, we find that a wheat crop abstracts from the same area five times as much inorganic bases as the beech, ten times as much as the pine ; the turnip ten times the amount of the beech and twenty-two times that of the pine.

From this comparison of well authenticated calculations it would appear that tree-culture has the advantage over agriculture as regards the quantity of inorganic bases required.

Still more favourably stands the case if we compare them qualitatively.

The wheat, for instance, yields nearly from one hectare, according to Fresenius, 32.55 kilo of potassium, or five times as much as the beech and nearly ten times as much as the pine ; of phosphoric acid 20.31 kilo, which is five times as much as the beech and ten times as much as the pine ; of sulphuric acid 20.58 kilo, that is fifty-seven times as much

as either tree ; of silicic acid 129.35 kilo, or thirty-seven times the amount of the beech, and as much as one hundred and forty-three times of the pine. It is not to be forgotten that sulphuric and phosphoric acids are very scarce in any soil.

The beech, however, requires considerably more lime than wheat, the latter yielding 12.93 kilo per acre to 20.29 kilo for the beech.

Whilst then these trees, and undoubtedly all others, use chiefly these inorganic elements, which appear abundantly in every soil, agriculture robs the soil of its rarest components.

We may here adduce the experience of farmers, that the winter crops do not need so much manuring as summer crops, and that the former prosper even on a soil of less mineral vigour.

This may be explained by the fact that the winter crops have a longer term of vegetation, and during the same find more opportunity to supply themselves and assimilate the necessary inorganic elements ; for the summer crops, on the contrary, it is necessary that the soil should be either well manured or easily decomposable. Our woody plants enjoy, like the winter crops, a long term of vegetation, and consequently, can prosper on soils that are slow to decompose.

We have then, from a theoretical point of view, sufficient reason to maintain that the production of timber is much less dependent, nay almost entirely independent of the mineral composition of the soil. This truth we could easily demonstrate by observations from the practice in Germany, where on the mica sand of the Main plain, and the sea sand of the North German plain, the poorest soils in regard to chemical composition, the finest growths of pine and beech may be found. Whoever has travelled through Saxon Switzerland, will agree that on the sandstone of that region, which forms one of the poorest soils, in moist situations, beech, fir, and spruce, species which require favourable conditions of growth, prosper exceedingly.

That it is not the mineralogic condition of the soil, but rather its humidity, which determines the forest growth, may often be observed, when on a soil of the same origin and mineralogical composition you find here a most excellent growth, whilst on the drier portions the growth is considerably retarded and stunted.

We may claim then, that any soil in its natural condition, *i. e.* which has not been used for agricultural purposes, contains sufficient inorganic elements for any timber-growth ; that therefore the change of species observed in this country can hardly be attributable to an exhaustation of the soil, but to other causes as we shall see later ; that a change or rotation of crops, though it may be in some cases advisable for financial or even forestal reasons, is not a necessity for a successful forestry, as it is in agriculture, and that, if taking place by itself, it is a sign of mismanagement of the original forest.

Finding then that the chemical composition of the soil is not of much importance in forestry, it must be its physical condition which determines a more or less prosperous timber growth. And so we find all observations on the continent at least coincide in this result, that the greatest mass of wood and the most regular growth of timber is yielded by a soil which is deep, sufficiently loose and rich with humus, and which at the same time possesses a degree of humidity proportionate to the wants of the species growing thereon.

To understand the character of a soil it will be necessary to discriminate several strata in the same ; we may call that upper part of the soil which the roots penetrate the surface soil, in opposition to the lower strata or subsoil. These two strata may offer different relative appearances ; they may be similar, *i. e.*, either both difficult to penetrate like rock and clay, or else easily permeable like sand, loam, or disintegrated rock ; they may be of different character, when either may be hard or loose ; the commonest case being a hard subsoil below more easily permeable surface soil, as for instance when clay or rock or bog iron stone exists below sand or loam. Of course, these strata do not generally exist in this marked distinction, but in gradual transition, the looseness decreasing with the depth.

In the subsoil strata the angle of inclination is of importance, as upon it partly depends the capacity of the soil to retain water. We discriminate in regard to water a pervious and impervious soil. Thus plastic clay, undisintegrated rock, or a horizontal or

only slightly inclined layer of subsoil, forms an impervious soil. If the subsoil present a vertical or strongly inclined stratification an unfavourably quick percolation of the water may be the consequence, whilst a horizontal stratification of impervious subsoil may cause detrimental stagnation.

According to the depth of surface soil we discriminate a deep or shallow soil, which properties, however, must be considered relative to the species of tree which is to grow on it; for a soil may be too shallow for oak, which is sufficiently deep for beech and fir.

Depth of soil, *i. e.*, a deep surface soil is especially desirable and important for such species, as, like oak and spruce, form a taproot and which do not attain considerable height if the development of this root is impeded, especially when the lack of depth is not counterbalanced by extra humidity. The stunted growth of a forest will speedily indicate such a locality. Depth of soil favours the growth for the reason that it provides a continual reservoir of moisture. Therefore even those trees with shallow tracing roots prosper best in a deep soil.

The shallowest soil is generally due to plastic clay, the tenacious quality of which prevents the roots from penetrating deeply, consequently it is not fit for Oak *timber* forests. The same disadvantages are caused by bog iron stone, which consisting of a mixture of hydrous protoxide of iron, oxide of manganese, phosphoric acid, sand and organic compounds, forms continuous slabs not far below the surface, presenting an impenetrable barrier to the roots. In the province of Hanover, since its accession to Prussia, large areas of the Luneburg heath have been inforested by breaking up this stone with subsoil plows, and planting pine seedlings in the furrows, thus converting lands so long unprofitable into a source of wealth.

Looseness of soil, when accompanied by sufficient humidity, tends to produce a maximum of fibrous roots, which provide the plants with water and inorganic substances. Consequently the largest yields and especially the greatest height of growths, are to be found on alluvial soil, which from the manner of its formation must be very finely divided. From this cause too results the fertility of the inundation soils of ponds and of the marshes near the sea coasts. The superior growth on the fresh sweating sand is due to its looseness and depth.

Though the looseness of the soil is most conducive to *largest* yields, yet a soil will produce a *good* yield, if it is only sufficiently deep and moist, such as that formed by disentegrated rock.

In regard to *humidity* the different species require a different degree of moisture. Most of the forest trees require only a "fresh" soil (which when pressed leaves traces of moisture in the hand); some species, like the ash, prosper still in "moist" soil (which, when pressed, drop water); and the elder requires even a "wet" soil (which drops water without being pressed.) A dry soil is a favourite with no species, though birch and pine can best exist on it.

Two circumstances determine the degree of moisture in the soil, its character and its position. The soil in valleys, river places, near lakes and seas and on northern exposures contains more humidity than that of the mountain ridges, on eastern and southern exposures. One quantitative determination of this difference is known to the writer, where the accretion of a beech growth, fifty-nine years old, on one of the Hessian mountains was measured, and it was found that the accretion on the southern aspect bore the proportion to that of a dell and to that of a northern aspect as 16 : 39 : 48.

The favourable appearance of tree growth on northern aspects may be considered due to the greater depth of soil generally found in such localities, and this again is due to the fact that the moisture, which promotes and expedites the disentegration of rocks, is not as quickly absorbed there as on other exposures more subject to the drying influence of sun and wind.

The lacking humidity of soil may be compensated by the humidity of the atmosphere, especially for such species as, on account of their dense foliage like the beech, evaporate profusely. This accounts for the excellence of the growth in higher mountainous regions where the atmosphere is generally moister than on lower levels.

Considering that thirty to fifty per cent. is constituted of water, and of the dry substance forming the wood, called cellulose and lignine, forty-seven per cent. is composed of

oxygen and hydrogen in the proportion of water, it is no wonder that the humidity of the soil is of so much importance for timber growth, and its supply may be held as the chief office of the same.

Another factor of the soil has been considered in the light of a plant nourisher, and through its chemical influence favourable to tree growth. This is the *humus*, which forms the covering of all good forest soils, and is produced by the decay of the yearly fallen foliage, twigs, etc., and other decaying vegetable matter, and consists of the combination of neutral salts. The acids which are formed in some humus soils, according to Liebig, are not components of a fertile humus, but belong to that of peaty and marshy soils, which are not favourable to tree growth. Carbon, hydrogen, and oxygen are the main components of humus. It has been asserted that the humus ought to be considered as furnishing the supply of carbon, which forms the largest part in the composition of the woody fibre. For any one who has seen the forests of large extent along the dunes of southern France and the sea sand of the north German plain, lacking all traces of humus, nay, containing so little carbon that after heating it will not leave a trace of black colouring, it needs not to cite Liebig's proof of the insufficiency of the humus or any part of the soil, to provide the amount of carbon necessary for the building up of the tree and a forest. Besides, who could reasonably accept, as logic would compel us, the creation of decayed organic matter previous, and as a condition of following plant life.

Yet that there is a chemical influence of the humus on forest growth cannot be denied. Not only does the decaying vegetable matter develop a considerable amount of ammonia, which imparted to the atmosphere enriches it with the needed nitrogen, but also of carbonic acid, which contributes largely to the disintegration of the rocks and increases the solubility of the carbonate and phosphate of lime. This influence will be readily admitted as important, when we remember that in ten thousand parts of pure water only one part of carbonate of lime is soluble, whilst in the same quantity of water acidulated with carbonic acid, ten parts of that salt will dissolve.

But the greatest significance of the humus lies in its physical influence, which is the more important, where the other factors of "soilbonity," depth, looseness, humidity are lacking. A considerable layer of humus increases depth ; as a bad conductor of heat it counteracts the drying effects of the sun, which, added to its capacity of absorbing easily and retaining long the meteoric precipitations, makes it a very desirable covering of the soil. The humus being of medium looseness tends to diminish the extremes of the physical properties of the soil.

We may here sum up the influence of the soil on forest growth by stating that its chemical composition is only of minor importance, almost all soils furnishing sufficient inorganic bases of the description which is needed by forest growth ; that its main influence consists in its physical properties, represented by its depth, looseness and, depending on these, the capacity of absorbing and retaining moisture, which properties may be increased or even compensated for by a sufficient layer of humus. The existence of these properties in their highest perfection in due proportion are conducive to the prosperity of any species, yet the necessity of their existence is a relative one with regard to the different species.

Seeing then that the soil, though a contributor, does not form the bulk of those elements which form the fibre of the tree, we must look for another source of supply. By a simple mathematical calculation we find that the 1846 kilo of carbon, which are represented by the yearly accretion of one hectare of pine forest cannot be supplied by the soil. There is then only the atmosphere left as a source of this component as well as of the small quantity of nitrogen required.

We need not go into any proof that the quantity of carbon present in the atmospheric air is sufficient to grow wood on the entire area of our globe, nor need we apprehend any danger from overproduction of carbonic acid to the detriment of vegetation. In short we may conclude, that on the whole we need not apprehend any danger of exhaustion of the sources of food, which our forests require, such as we see possible in our coal mines. But it is incumbent on us to utilize this inexhaustible source of plant food by providing the proper means for its conversion into marketable values, that is, by promoting and directing the growths of forests.

Yet tree-growth as well as all other vegetation is confined in locality. Even the

deepest, freshest, most excellent soil will refuse to support vegetation above the line of eternal snow. That the temperature of the climate generally exerts great influence on all vegetation may be inferred from the observation of the flora of different climates. As the temperature declines from the equator towards the pole and from the sea level towards higher elevation, so we find that the forest growth in both directions shows a less diversified appearance and species, and at last a decline in the number of individuals.

This question of climatic influence on tree-growth becomes of practical interest, when the possibility for existence and prosperity of a tree species under certain climatic conditions is to be ascertained for the purpose of introducing new species, and it becomes necessary to determine whether the thriving of a species depends on the mean yearly, the mean summer or winter temperature, or on the extremes of temperature. The solution of this question is as yet possible only on grounds of observation in regard to the natural distribution of trees, or else must in each individual case be ascertained by experiment.

It is not probable that the mean yearly temperature influences the growth much, as may be inferred from the fact that localities of equal mean yearly temperature show a very different influence on their timber growth.

Whilst in Siberia the willow grows on frozen soil, which thaws for a few summer months, the St. Gothard Mountain, though enjoying a higher mean temperature than the locality referred to in Siberia, is entirely bare of all vegetation. It is rather more probable that the distribution of species depends mainly on the mean temperature of the summer, or better on the length of the time of vegetation. For tender species the line of distribution will no doubt be determined by the lowest extreme of winter temperature, which may cause death by frost. On the contrary extremes of summer heat, if accompanied by sufficient humidity of soil and atmosphere are not opposed to the cultivation of species, which in their natural occurrence belong to northern or elevated localities with lower temperatures.

It may be mentioned here, that the different temperatures of the soil, depending greatly on its colour, may hasten the revival of vegetation in spring and thus expose the young buds to late frosts. In some localities the phenomenon of frosts rendering tree culture hazardous is due to a rapid evaporation of the moisture of the soil as in the dells, and vales, and on heavy, impervious soils where water is collecting and insufficient circulation of air impedes its speedy removal. Plateaus too suffer often from frosts, when plains with the same mean yearly temperature are left intact.

This phenomenon is mainly due to the increased radiation of heat during the night because the thinner strata of air in such plateaus offer less resistance to radiation.

So far we have considered such conditions of forest growth as are in the majority of cases given and often unchangeable; we have to accept them as they exist and try to make the best of them. If our soil is a dry sand we shall not be able in most cases to adapt it to the cultivation of elder or ash; if we live so far north that the period of vegetation is too short for the prospering of the oak, we may as well not attempt its cultivation, and so on. There is little scope for changing the conditions of soil, air, climate, or at least the change can be effected only in an extended period of time and by careful forestry.

But here a condition of forest growth presents itself, which largely, we may say entirely, lies in the hands of the forester; a condition which he is able to create and control, on the understanding of which a successful management of his plantation must be based throughout. In fact we may say that the most important criterion in forestal operations, is formed by the relation of the forest trees towards light and shade. The conditions created by the existence or absence of the proper amount of light, we should characterize as the principal one for the consideration of any manager of forests. We do not mean here to discuss the physiological influence of light on vegetation in general, which shows itself in the decomposition of the carbonic acid of the air, thus furnishing the means of assimilation of the carbon which is necessary for the growth of the plant, its colouring, the ripening of the seed, etc.; but the necessity of providing in the forest a proper amount of light or shade according to the wants of different species in their different ages.

The credit of having drawn the attention of foresters to the importance of this relation of forest trees is due to Dr. G. Heyer, now Professor of Forestry in Munich, the

exposition of whose theory has induced a better comprehension and a modification of existing methods of management.

It is a known fact, that the higher the organization of a plant the more light is needed for its proper growth with few exceptions, such as some cryptogamia and mosses, which require direct light. Most of the mosses prosper with a small amount of light under the shade of trees, and disappear when the forest in its more advanced age grows thinner. The contradiction to this rule presented by the vegetation in mountainous regions is only an apparent one, because there the frequent mists replace the shade of forest trees.

The most highly organised plants exist in that part of the globe, where the sunlight is most intense and the farther we go from the equator towards the poles, the more increases the proportion of cryptogamia to phanerogamia.

Now the quantity of sunlight necessary for the development of the most highly organised plants, the Cotyledons, is very different for difierent species and genera. Many plants of this group can only live in the shade of forest trees, like the Asperula monotropa, and disappear with the removal of the forest. So do the forest trees themselves evince a difference of requirements with regard to light and shade, and on these different requirements are based many important forestal operations.

All forest trees may be classified into three groups, which, however, gradually run into each other, and express the relative position of each species with regard to its need of light or shade. We may call these groups the shade-loving, shade-bearing, and light-needing. Criteria for the classification of the different species into these groups are given in the appearance of the foliage, its greater or lesser density, in the capacity of overshadowed branches and trunks to sustain life and to withstand the shading out by the domineering neighbours, and in the power of young seedlings to prosper in the shade of their mother trees.

In judging of the foliage of a species, such specimens as have grown in the full enjoyment of sunlight, ought not to be chosen as samples, because this full enjoyment of light tends to enlarge the amount of foliage and so to form a denser crown; it is only in the forest that the characteristic appearance of foliage belonging to each species can be discerned.

Those species which form dense crowns, evidently need less light than those with higher foliage, for, as the interior leaves of the former get less light, and yet vegetate, it is evident that they need less for their existence. Yet though some species, like the fir, are so tenacious that for sixty or more years they will preserve life under the dense shade of the overshadowing forest, there is no doubt that all species, after a certain period of life, prosper best and increase in the greatest ratio when in the full enjoyment of light, because light favours the production of a large number of leaves, which in their turn excite greater activity in the processes of life or growth of the plant.

This effect of the sunlight is probably not so much due to its luminous quality as to its temperature, which incites evaporation through the leaves, and with it circulation of the sap.

It is natural that species with a dense foliage *i.e.* with a large leaf area, tend at the same temperature to evaporate more water than those with lighter foliage, and therefore draw more heavily on the moisture of the soil than the latter, or we may say on the same soil, under the same conditions, the trees with light foliage will longer withstand the drying effect of the hot sun, than those with dense foliage. This influence of the sun, inducing increased evaporation, tells, especially in young plants, where the roots are drawing their supply of water from a confined area, and the foliage does not stand in a favourable proportion to that area. In this period of life, it is of the utmost importance to the forester to understand this interrelation of sunlight, foliage, and humidity of soil to shape his operations accordingly.

The writer is as yet not sufficiently conversant with the requirements in that respect of the species, which forms the forests of North America, to be able to attempt the establishment of a scale, denoting the relative capacity of the species to sustain shade or their comparative demand for light.

In Germany, where we have only fifteen or sixteen species, that may be considered worthy of notice in the realm of forestry, Dr. Heyer established the following scale, in which

the first three or four species named, are those that demand in their youth an unprepared soil, shade for their proper developments, the others in their sequence are placed according to their capacity of sustaining shade, the latter absolutely requiring direct light for their development.

The series is :—

Spruce (*Abies pectinata, &c.*)—Fir (*Pinus abies L.*) equivalent to *P. balsamea.*

Beech (*Fagus sylvatica L.*)—Pinus austriaca (*nigricans*). Chestnut (*Castanea vesca*) —Hornbeam (*Carpinus Betulus*).

Ash (*Fraxinus excelsior L*).

Oak (*Quercus robur*), practically only one species in Germany against fourteen in the United States.

Maple (*Acer campestre* and *pseudoplatanus*)—Alder (*Alnus glutinosa* and *incana*).

White Pine (*Pinus strobus*).

Common Pine (*Pinus sylvestris*).

Elm (*Ulmus campestris*).

Birch (*Betula alba*)—Aspen (*Populus tremula*)—Larch (*Larix europaea*). The first three can (in Germany in unprepared forest soil) not be forwarded without the protection of nurse trees. In nurseries, and where the preparation of soil favours a stronger development of the roots, and the capacity of the soil to absorb moisture from the air is heightened, plantations prosper without shade ; so they sometimes succeed in mountainous regions with frequent mists and cloudy sky, yet according to good authorities, nine out of ten plantations fail even there.

The fact, that on a loose and sufficiently "fresh" soil the young growth of these species makes less demand on the shady protection of their nurses than in drier localities, confirms only this theory of the correlation of light, vegetation and humidity of soil.

The hornbeam, ash, and oak, and here we may add the American chestnut, will go to seed under the overshadowing mother trees, but soon the vitality of the young plants will be impaired, and if, with their increasing growth, the supply of light is not granted in proportion they weaken and die. Here again a humid soil will help to sustain life longer, by producing a larger amount of leaves, *i.e.*, increasing the area of evaporation.

The species named towards the end of the list demand at an increasing ratio the influence of direct light for their development, the larch, above all, finding it almost impossible to exist, where it is shut out from a perfect enjoyment of light.

That the American forest trees make in this particular case an exception, nobody will maintain, and there is no doubt, that they can be similarly grouped as to their relation towards light and shade.

May we not here perhaps find a clue to the change of species or rotation, in the agricultural sense of the word, which has been observed in this country? Is it not the human hand which has produced indirectly this change, by destroying the conditions propitious for the one species and favouring those necessary for another by removing the shade of nurses, which the existing species needed for its youthful life, and thus creating a growth of species that are more able to develop under the direct rays of the sun? Has not perhaps the indiscriminate denudation, giving access to the scorching sun and drying winds, reduced the humidity of the soil so far as to exclude the existing species from satisfying its greater demand for moisture?

In changing other conditions of growth too such alternations of species are natural. Removing the valuable timber before the seed was dropped will invariably give preponderance to the quick-growing mostly less valuable kinds, which bear seed every year, and whose light seeds are carried over large distances by winds, insects, etc.

We will not dwell on this theme, which has so unfortunately drawn the attention of the cisatlantic foresters in the wrong direction, and only once more lay stress on the consideration, that no chemical condition but the *physical* conditions of forest-growth are underlying the noted alternation of species ; species, that with regard to climate and soil are

more easily accommodated, such as produce more and easily dispersed seed will conquer the captious ones and those with heavy seed and deeprooting kinds will maintain existence in regions, where continuous droughts would kill the shallow-rooted ones in their youth; species that require a long duration of the vegetation period will recede or be overpowered by the quick growing ones; species of slow growth may be crowded out, when quick growing ones find otherwise favourable conditions. Territories which offer favourable conditions to only one or a few species will present pure forests of one, or nearly one kind only, whilst more diversified conditions will through centuries show a varied appearance of forest; in the end perhaps, however, the shade enduring, longlived, heavy-seeded ones will domineer. In forests, where the shade-loving species, such as beech and spruce, have acquired absolute sovereignty, in consequence of human management (absolute clearing), the light-foliaged and light-seeded kinds will gain ground. In short these appearances and changes are the result of that continuous struggle for existence, which pervades all nature and is modified in many ways by the hand of man.

I know that I have only incompletely and in a general way pointed out some of the more important conditions which underlie the growth of our forests. I have done so without any attempt to exhaust the theme in any particular, but have merely endeavoured to draw your attention to the fact, that the whole science of forestry is built, or in the case of this continent, is to be built, upon a very complicated system of elementary knowledge, which can only be gathered by local observations based on a correct understanding of the physical forces at work.

Though there are many minor and local influences conditioning forest growth, those discussed in the foregoing remarks may be considered as the principal and determining ones. And without tracing step by step the deductions possible from these for a correct management of forests, we confine ourselves to giving in conclusion, in the form of short theses, such rules of management as result from a logical consideration of the foregoing expositions, the observation of which will at least insure a healthful preservation of existing and a successful growth of new plantations.

1. The principal effort of the forester must be to preserve and increase the "soilbonity" as defined in the foregoing paper, since upon it depends the productivity of the forest.

2. The measures to be adopted for this purpose are not much to be sought in direct operations on the soil, but mainly in certain considerations in the selection of species, methods of management, terms of rotation, interlucation, methods of reproduction, and in the general care of the forests.

3. Only such species should form the predominant part of the forest as are able to preserve the "soilbonity." These are the shade-enduring and the evergreen.

4. Where an increase of depth, looseness and humidity is especially needed, it is essential that such species should be cultivated as, through a plentiful fall of leaves, favour formation of humus, and by the density of their crowns keep out the two enemies of humification: sun and wind.

5. If for a length of time one species alone is to be cultivated, it must be one with a dense foliage. Light foliaged ones can only be allowed where Nature has provided in some other way for the conservation of the "soilbonity," because they not only furnish too little material for humification, but impede the latter by giving sun and wind access to the soil, thus drying it up and impoverishing it.

6. Mixed forests afford greater security against damages by wind, fire, frost, snow, diseases, besides yielding a larger amount of wood. In these the predominant species must be one of the shade-loving or enduring, densely-foliaged, which protect the soil. The light-needing, thinly foliaged species are only to be mixed in by single individuals, and not in groups, and must be quicker growing or have an advantage in age or height.

7. Two or more shade-enduring kinds can only be mixed, if they are equally quick growing.

8. In growths which in later years become less dense any underbrush is favourable as protection against sun and wind; the cultivation of such artificially may be advisable from financial considerations, though it may not be justified.

9. The distance of the plants in new plantations ought not to be more than three to four feet, as only thus a sufficient covering of the soil can be effected. Besides the yield

of wood per acre stands in direct proportion to the density of growth, *i. e.*, the number of plants per acre.

10. Of all the methods of management, the timber forest with natural reproduction from seed trees is best calculated to maintain the vigour of the soil, for shade-enduring species, if the cutting is done with necessary prudence, so that the soil is exposed as little as possible. Next to this method comes absolute clearing, with immediate artificial re-seeding or replanting. This is almost the only method advisable for light-foliaged trees.

11. Short terms of rotation remove the protection oftener from the soil; long ones carry the danger of soil impoverishment, owing to the natural thinning out of most species in later stages of growth.

12. For interlucation the principal rule is never to deprive any portion of the soil of the protecting cover of the crowns; it is best to confine the thinning out to the over-shadowed, dying trees.

THE CULTURE AND MANAGEMENT OF OUR NATIVE FORESTS, FOR DEVELOPMENT AS TIMBER OR ORNAMENTAL WOOD.

By H. W. S. Cleveland, Chicago, Ill.

No one can travel through any portion of the States east of the prairie regions, without being impressed by the fact that he is never out of sight of woodland. In fact, the chief cause of the prevailing apathy on the subject of forest planting, arises from the fact of the great abundance of groves and extended forests, which convey the impression, in spite of the assertions of staticians, that there is still enough wood growing to supply the place of that which is removed.

The Duke of Argyle, in the interesting sketch of his trip through the States, published after his return to England, says emphatically that nothing in the aspect of the country surprised and impressed him so much as the great amount of wood still remaining, and everywhere giving beauty and variety to the landscape; but he added that it was everywhere the beauty of the wild-wood, which never bore any evidence of culture or effort to increase its value by artificial development.

"I saw nothing (he says) that could be called fine timber, and no woods which showed any care in thinning, with a view to the production of such timber in the future."

Such a criticism is not surprising from one who, like most country gentlemen of England, is familiar with the process of forest culture, but it certainly is surprising that, with all our boasted intelligence, we still remain practically insensible to the fact that, while almost every tract of woodland contains a large per centage of such trees as are most valuable for timber, already well advanced in growth, and susceptible, by judicious management, of being developed into proper form and size for use in far less time and at far less cost than would be required for the planting and growth of new forest; yet, if left to themselves, not one tree in a thousand will ever be fit for anything better than fencing stuff or fuel. Vast resources of wealth are lying latent and running to waste in our woodlands, and we stand stupidly unconscious of the fact that its development requires simply the application of the intelligent culture we bestow on all other crops. In many instances, it is true, the native woods have been so long neglected, that they are past redemption, but there are, nevertheless, large areas of continuous forest, and smaller groves and wood-lots in every section of the country, now yielding no revenue, which might, by proper annual thinning, pruning and culture, be developed into timber forests of very great value, while yielding an annual crop of firewood in the process.

Where shall we find, or how shall we create, the men who are competent to the work? To judge from invariable practice, our people seem not only to be ignorant of the first principles of forest culture, but unconscious even of the possibility of its application to the development of our native woods. The fact of such prevailing ignorance rests not alone upon negative evidence. We have positive proof in abundance in the attempts which we often see at the "improvement" of a piece of woodland when it is appropriated as the site of a residence. It is hard to conceive of anything more dismal and forlorn than the average result of the effort to impart a home-like aspect to such a place; the

dwelling, with its "span new" expression, standing in the midst of a multitude of tall poles, with tufts of leaves upon their tops, looking like fowls stripped of their feathers, and the bare ground fretted everywhere with freshly upturned roots, the sole remnants of the wild shrubbery which has been ruthlessly exterminated.

In order to a comprehension of the principles of healthy forest growth, let us consider some of the processes of nature, and learn from them her requirements.

If we plant the seed of a maple, chestnut, linden, oak or ash tree by itself in the open ground in suitable soil, and suffer it to grow without molestation, simply guarding it from injury, we shall find that the first act of the young plant is to send out broad leaves, which serve among other purposes to shade completely the stem, and the ground immediately around it in which the roots are growing. As the tree grows, it preserves a symmetrical shape, the limbs spreading and the trunk increasing in size, in proportion to its height, but always preserving the condition of keeping the trunk and the ground for a considerable distance around it, in the shadow of the foliage till mature age, when the roots have penetrated to such a depth as to be safe from injury, and the trunk is protected by thick layers of cork like bark, which safely guards alike from heat and cold the inner layers and young wood in which the sap is performing its functions.

Such are the conditions to which nature adheres, if not interfered with by accident or design, and such, therefore, we may be sure, are those best adapted to healthy and vigorous growth. The fact that they are continually violated with apparent impunity, serves only to show the wonderful power of nature to supply deficiencies, and adapt herself to circumstances, but in artificial culture, we should aim as nearly as possible to imitate the course she would pursue if unimpeded.

The requirements of nature are of course the same when trees are growing together in a forest, as when they stand singly, but the conditions of growth are so changed that the end is attained by entirely different means.

If we enter a tract of wood land, covered with a hard-wood growth of an average height of thirty or forty feet we find it composed almost exclusively of trees which have run up to a great height in proportion to the spread of their limbs. The largest and oldest of them may have had some lateral branches which are now dead, but the younger growth will consist only of tall, slender stems, without a branch or leaf except near the top. It will be difficult, perhaps impossible, to find a single tree possessing sufficient symmetry of form to be worth transplanting for ornamental use. A little reflection will serve to convince us that this form of growth, so different from that of the single tree in the open ground, is the natural result of the action of the same rules under changed conditions.

When a young wood first springs up on open ground, each tree begins to grow as if it were alone, sending out lateral branches and preserving its just proportion. But whenever these laterals meet and mingle with each other, they shut out the sunlight from all below, and thence forward all lateral growth must cease, and each individual is struggling upward to keep even with its neighbours and secure its share of the sunbeams which are essential to its existence, and which can only be had at the top. It thus becomes forced out of all just proportions in the effort to keep even with its fellows. The conditions of keeping the trunk and roots in the shade, however, are even more rigidly adhered to than in the case of the single tree, growing by itself, for the whole area of the wood is shaded, and, moreover, the trees on the edges of the wood, if not interfered with by men or cattle, will be clothed on the outer side with limbs and foliage clear to the ground, so as to check the free passage of the winds whose drying influence upon the soil is even more active than that of the sun.

If we examine more closely we shall find that nature adapts herself to these changed conditions, and avails herself of whatever advantages they afford.

The single tree when growing by itself sends its roots deep into the ground in search of the moisture which cannot be had near the surface, and thus, when it reaches mature age, it draws its supplies from sources beyond the reach of temporary changes, and, moreover, secures so firm a hold upon the ground that it suffers no injury from the storms that assail it, but fearlessly stretches forth its arms as if to challenge the gale.

In the woods, on the contrary, the surface soil never becomes parched or heated, but maintains an even degree of temperature and moisture in consequence not only of the ex-

clusion of the sun and winds, but of the deep mulching of leaves which annually cover the ground and keep it moist, while, by their decomposition, they form a rich mould comprising all the ingredients of vegetation.

If we dig only a few inches into this mould we find it everywhere permeated by fibrous rootlets emanating from larger roots, which under these circumstances have kept near the surface where they draw nourishment from the rich material there provided. If the single tree in the open ground had tried to live by such means, it would speedily have perished for want of nourishment, or would have been uprooted by the winds as forest trees are liable to be when left alone in a clearing.

In the woods the necessity no longer exists of sending the roots to a great depth either in search of nourishment or for support against storms, and nature always adapts herself to circumstances and attains her ends by the simplest and most economical means.

If we now consider the facts I have stated, which anyone can easily verify for himself, we shall find that all the essential principles of tree culture are comprised within their limits, and by their rational observance we may secure healthy and vigorous trees, and develop at will either such forms as will fit them for timber or for ornamental use.

The five trees I have cited—maple, chestnut, linden, oak and ash—are among the most common and yet the most valuable of our forest trees, and may be taken as representatives and proper illustrations of the facts I am stating. Either of these trees, if growing by itself in proper soil and undisturbed by other than natural influences, will attain, at maturity a height of seventy or eighty feet, with a spread of limb equal in diameter to its height, and a trunk of such massive proportions as leaves no room for apprehension of inability to uphold the wilderness of foliage it has to support. But these same trees, if growing in a wood, will send up a slender stem, straight as an arrow, fifty, sixty, or seventy feet without a limb or a leaf, till it reaches the average height of its fellows, and sends out its tufts of foliage to secure the benefit of every sunbeam it can catch.

We see, therefore, that if we wish to form a beautiful and symmetrical tree, or a grove of such, composed of individual specimens of majestic and graceful proportions, we must allow it free access to sun and air, with full power of expansion on every side. While young, however, the growth will be more vigorous and healthy, and we can develope the desired forms more easily and successfully, by leaving a much greater number of trees than are eventually to remain, and removing from year to year all which are near enough to the final occupants to check or impede their full development.

If, on the other hand, we wish to develop the trunk or bole for use as timber we must plant, or suffer the trees to grow more thickly together, and thus extend its trunk longitudinally by forcing it to ascend in search of the sunlight on which its very existence is dependent. The indigenous growth, however, is always a great deal too thick for successful development. The trees are so crowded that many of them perish in the struggle, and those which survive are drawn up into such spindling proportions that not one in a hundred ever attains the dignity of timber, whereas by proper and reasonable thinning, and judicious culture and pruning of the trees selected for final retention, every acre of woodland might be made to yield an annual crop of fire-wood, and all the while be growing timber, which eventually, in many instances, might be worth more than the land itself; or by a different process of management may be converted into a grove of majestic and graceful, ornamental trees.

The proper performance of this work constitutes the most important part of forest culture, and for want of the knowledge of how it should be done, or from ignorance of the possibility of its application to our native forest, a vast area (in the aggregate) of woodland is running to waste; yielding no revenue and promising nothing better in the future than fire-wood, of which a very large proportion is yet susceptible of redemption and conversion into timber of great value at far less cost of time and labour than would be required for the planting and rearing of new forests, while the very process of development would be yielding an annual income instead of demanding large outlays.

Travel where we may we are never out of sight of forest, and every wood lot is a mine of wealth, waiting only the application of intelligent labour for its development. In almost every tract of woodland may be found more or less of the trees I have named, and in many places also hickory, walnut, butternut, elm, cherry, beech and other valuable

timber trees, mingled with a great variety of those which are worthless, or fit only for fuel. In some cases they are past redemption, having been so long neglected that they have run up into mere thickets of hoop-poles. Young growth may everywhere be found, however, which are in condition to be taken in hand, and in almost all cases the work of thinning and pruning may be entered upon with a certainty of profitable results if wisely and perseveringly conducted.

The work of thinning, as ordinarily conducted in the occasional instances in which on any account it has become desirable, is entrusted to mere labourers, who have no regard for the natural conditions which are essential to healthy growth, and which can not be suddenly changed, without serious injury to the trees that are left.

All the small growth of shrubs, such as hazel, cornel, dogwood, elder, shad-bush, etc., is first grubbed out and destroyed under the general term of "underbrush," and this not only throughout the interior of the wood, but around its outer edges where such shrubbery is apt to spring up in thickets, which serve the very important purpose of preventing the free passage of the wind over the surface soil of the interior, besides adding incalculably to the beauty of the wood, as seen from without by connecting the line of foliage of the trees with that of the sward below, and presenting a living mass of verdure. The trees which are considered most desirable to preserve are then selected, and all the rest at once removed. Finally the leaves are carefully raked from the surface and carried off or burnt.

Sun and wind now have free access to the soil, and it very soon becomes parched and dry. The fine rootlets near the surface, which have heretofore been preserved by the never-failing moisture of the rich mould under its mulching of leaves, are converted into a mass of wiry fibres, no longer capable of conveying nourishment, even if it were within their reach. And while the means of supply are thus reduced, the tall, slender trunk, through which the sap must ascend to the leaves, is now exposed to the free action of the sun and winds. Now I do not presume to say that evaporation can take place through the bark, but the provisions which nature makes to guard the inner vital tissues from the effect of the sun's rays, indicate beyond all question that they are in some way injurious. I have elsewhere shown that in the case of the single tree growing by itself, the trunk is always shaded by the spreading foliage, when suffered to retain its natural form. In the forest the trees shade each other, and thus effect the object by mutual action. But now let me call your attention to another provision of nature which few people observe, but the meaning of which is too obvious to be mistaken. If we examine the bark of an oak, elm, chestnut or maple, of mature age, which has always stood by itself, exposed to the full influence of atmospheric changes, we find it to be of great thickness of very rugged character, and of a cork-like consistency, all of which characteristics make it the best possible non-conductor of heat or cold that can be imagined, under the protection of which the living tissues are safely kept from injury through the burning heat of summer and the intense cold of winter.

Now go into the forest where the trees shade each other, and wind and sun are excluded, and you will find that the bark of the trees is smooth and thin in comparison with that of those in the open ground.

Nature never wastes her energies needlessly, and the trees in the woods do not require the thick coat of those that are exposed. But the effect of suddenly admitting the sun and wind upon them is precisely the same as that of exposing any portion of the human skin which had hertofore been clothed. It is to guard against injury from this source that experienced tree-planters, when removing large trees from the woods, are accustomed to swathe the trunks with ropes of straw, which is a rational process, yet it is by no means uncommon to see the reverse of this action. I have seen during the past winter a great many very large fine trees planted on the best avenues in Chicago, at a cost of certainly not less than fifty dollars each, from the trunks and large limbs of which all the rough bark had been carefully scraped, leaving only a thin, smooth covering over the inner tissues. This is as if a man should prepare for unusual exposure to heat or cold by laying aside all his clothing.

Few persons, even among those whose business is tree culture, have any just conception of the value of thorough mulching, as a means of promoting the health and

vigour of growing trees. In fact, such a mulching of the whole ground as nature provides in the forest by the annual fall of the leaves, may be said to be unknown in artificial culture, so rarely is it practiced, yet its immediate effect in promoting new and vigorous growth is such as would seem almost incredible to one who had not witnessed it, and affords one of the most beautiful illustrations of nature's methods of securing the most important results by such simple and incidental means that they escape our notice, though going on right under our eyes from year to year.

Of course the richest food for plant consumption is in the soil near the surface, but if that soil is subjected to alternations of temperature and moisture, sometimes baked in clods, and at others reduced to the consistency of mire, no roots can survive the changes. In the forest, as I have elsewhere said, these changes are prevented by the shade of the foliage and the mulching of fallen leaves. The rich mould of the surface soil maintains an even temperature, is always moist, and is everywhere permeated with fibrous roots drawing nourishment from the rich sources which surround them, and this process may be artificially imitated, and the same results attained, by mulching, if properly done. It does not suffice to pile a few inches of straw or manure around each tree for a short distance from the trunk. If the tree stands singly, at a distance from others, the mulching should extend on every side beyond the spread of its branches; and in the case of an orchard, or young wood, the surface of the whole area it occupies should be covered with leaves, straw, shavings, chip-dirt, tan-bark, or whatever material is most available, to a depth of several inches. I first learned the value of the process when a young man, on a coffee plantation in Cuba, where a portion of the hands were constantly employed in collecting refuse vegetable matter of all kinds, and spreading over the whole ground between the rows of the coffee bushes, to such a depth as served to keep the surface cool and of even temperature, and also to prevent the growth of grass and weeds, and thus supersede the necessity of ploughing between the rows.

Afterwards, when engaged in fruit culture in New Jersey, I practiced it in my vineyard and orchards with most satisfactory results, of which an account was published more than thirty years ago, in the *Horticulturist*, then edited by A. J. Downing.*

The trees and vines responded at once to my efforts in their behalf by such increased luxuriance of growth that it was easy to distinguish the portions that had been mulched as far as they could be seen, and, on digging into the surface soil under the mulching at any point, I found it filled with fibrous roots precisely as is the case in the leaf mould in the woods. No fruit-grower who has once tried this experiment will ever after forego the advantages it offers, and I have spoken of it thus at length from the obviously vital importance of its bearing on forest culture. A moment's reflection will show that in the opening and thinning of native wood which had grown thickly together, a heavy mulching of such portions of the ground as may unavoidably become exposed, may be of most essential service in preserving the health and vigour of the trees that are to be retained.

It is difficult to lay down specific rules by which a novice could be guided in the work of opening and thinning out the wood of a native forest, except by fully impressing him with the importance of preserving, so far as is possible, the conditions which nature shows to be the most favourable to vigorous growth, and proceeding very cautiously when it becomes necessary to change the relative proportions of the influences which affect the vitality of the trees. The age and condition of the wood at the time the work is begun, are, of course, important elements for consideration. If the growth is not more than ten or fifteen years, and the trees have not sprung up so thickly as already to have become a mere thicket of hoop-poles, but have preserved a reasonable degree of symmetry, its management can be much more easily controlled than if it has attained a more mature age, and especially if the object is to create an ornamental grove composed of fine specimens of individual trees, a process by which the value of desirable residence sites in the vicinity of cities or large towns might often be very greatly increased.

Whether this be the object, or the development of timber, the first thing to be done is to select and place a distinguishing mark upon every tree which is ultimately to be retained. Then remove at first from its immediate vicinity only those which are actually

* *Horticulturist*, Vol. 3, p. 113.

crowding it, or impeding its growth by shading or interfering with its foliage. Those which simply shade the trunk or the ground around it are serving a useful purpose, and should not be disturbed. Indeed, if it is found that the necessary removals involve much increased exposure of the surface soil around the tree, it should at once be covered with a mulching of sufficient depth to prevent the possibility of its becoming heated and dry. All other sources of danger to the health of the trees are insignificant in comparison with that of the rude check they are liable to receive from sudden exposure of the trunks and surface roots to the influence of the sun and wind, from which they have heretofore been protected, and to which they can only become accustomed by a gradual change.

The next year it will be found that the tree has gladly availed itself of the opportunity for expansion, and has spread its limbs to fill the vacant space around it, so that more trees must now be removed, while the increased mass of foliage it has developed renders it less liable to suffer injury from their loss.

The removal of the undergrowth of shrubbery, should be very cautiously conducted, and in no case should it be removed from the outskirts of the wood, which should everywhere be left with as dense a growth as possible, to prevent the entrance of the winds.

The sirocco-like wind from the S. W., which often blows with great violence for days together, especially in the spring and early summer, when the trees are full of sap, and the young shoots and leaves are tender and sensitive, is the one from which most danger is to be apprehended. The merely mechanical injury it inflicts upon the spray and foliage is often serious, but its worst effects are due to its absorption of moisture and vitality.

All experienced nurserymen and fruit-growers, have learned to dread its exhausting influences especially upon grape vines and other broad leaved plants, and they too are aware of the fact, which comparatively few ordinary observers seem to have noticed, that its effect in giving a general trend of the spray and branches of trees in exposed situations toward the N. E., is so marked that no one who has learned to observe it, need ever be long at a loss to know the points of the compass in any parts of the country.

The fact, however, that we have it in our power to guard against the evil effects of this wind by artificial means, is not so generally known as it should be, and it was only after many years observation and experience that I came to a full realization of certain facts in connection with its action, which have a most important bearing upon the question of forest culture.

I became aware, many years since, that many shrubs, trees and plants would grow and thrive at Newport, R. I., and at Yarmouth, Nova Scotia, which in the interior were only found much farther south, and would certainly perish if removed to the latitude of those towns. The reason assigned in both cases was the warming influence of the neighbouring gulf stream, which seemed a plausible explanation in which my faith remained unshaken for years, until I went to Chicago, where I found it was impossible to grow many of the finer fruits, and some of the forest trees which elsewhere are found in much higher latitudes. Neither peaches or grapes can be grown at Chicago, or at any other point on the western side of the lake without artificial protection, and the native growth of wood is very meagre, and many varieties which elsewhere are found much farther north, as the beech and the hemlock cannot be grown ; yet the eastern shore of the lake, only sixty miles distant, has no superior in the whole country as a fruit growing region. Peaches, grapes, strawberries, etc., grow most luxuriantly anywhere on that shore up to the northern extremity of the lake, three hundred miles north of Chicago, and every variety of forest tree indigenous to the country is found in the best condition of vigorous health.

There is no gulf stream to account for this difference, but the relative position towards the lake of the whole extent of its fruitful shore is the same as that of Newport and Nova Scotia towards the ocean. In both cases the S. W. wind reaches the shore after passing for a long distance over water, and instead of burning and exhausting vegetation with a breath of fire, it comes laden with the moisture it has gathered up in its passage, and brings health and strength upon its wings, instead of disease and death. Further reflection served to convince me that the rule was susceptible of much wider application, and serves to explain the different vegetation of the eastern and western shores of great continents in the same parallels of latitude. Central Spain and southern

Italy the lands of the orange and grape are in the same latitude as Boston, and going west on the same parallel to California, we again find ourselves surrounded with fruits and plants which in Boston can only be grown under glass. Continuing our western flight across the Pacific, we find the flora of Eastern Asia to bear, in many respects, a striking resemblance to that of Eastern America.

These facts have certainly a very important bearing upon the question of forest culture. They prove that the S. W. wind of spring and early summer is perhaps the worst enemy we have to guard against, and also that its deleterious influences are neutralized when it passes over a large body of water. It is comparatively rare, however, that a situation can be secured affording that advantage, and the question naturally arises, are there no other means of protection? I am happy to have it in my power again to summon nature as a witness that such means are within our reach.

I have said that the beech would not grow near Chicago, a fact which I was very reluctant to admit on first going there, and was only fully convinced of its truth by witnessing repeated failures, and the evidence of reliable nurserymen who had tried in vain to preserve it. Yet after I had long been satisfied that it was idle to attempt its culture, I was one day amazed, while surveying in the woods a few miles from the city at coming upon a little group of beech trees comprising some twenty or thirty in all, of mature size and in full health and vigour. On examining the situation, to discover, if possible, an explanation of the phenomenon, I observed first that they stood in the bottom of a ravine so deep that their tops were scarcely even with its banks, while the wood which surrounded them extended more than a mile to the S. W., so that they were completely sheltered from the effects of the wind from that quarter. I have never been able to find or to hear of another beech tree anywhere in that region, and can only account for their presence by supposing the seed to have been brought from a distance by birds, probably crows, jays or wild pigeons, and dropped accidentally on the spot, which proved to be a "coigne of vantage," where they were safe from the enemy. The evidence thus afforded of the value of a screen on the S. W. side, should not be lost on those who are selecting sites for orchards, or vineyards, and shows the importance when thinning a wood, of leaving whatever shrubbery or foliage there may be on that side to arrest the progress of the wind.

The work of pruning the trees which are to be preserved for timber involves a careful consideration of the principles I have set forth, apart from the judgment required for the skilful performance of the mere manual labour. The object in view being the development of the bole, it is important to remove any limbs which threaten to become its rivals in size, if any such have become established before the work of improvement began. But after the trunk has attained the desired height, it is on all accounts desirable to develop the largest possible mass of foliage, because the making of wood can only be effected by the elaboration of the sap, which is the work of the leaves.

If one is rearing a new forest, in which the trees have been under his control from the time of planting, it must be the result of his own ignorance or negligence if he has failed to secure such forms as he desired, since it is easy to direct the growth of young trees, and prevent them from running into extravagances, which will unfit them for service as timber. And not unfrequently we may find a young wood of indigenous growth which may be taken in hand and wrought into such shape that its future progress can be easily directed. But, for the most part, in woods that have been suffered to run wild till they have approached maturity, a good deal of skilful pruning will be required to bring the individual trees that are to be preserved into such forms as will give them most value. Nothing but practice and careful observation can confer this power. The little treatise of DesCars on the pruning of forest and ornamental trees, translated by Mr. C. S. Sargent, of the *Arnold Arboretum*, and published by A. Williams & Co. of Boston, (price 75 cents) contains full and explicit illustrated directions for all the manual work of pruning, and is invaluable as a guide to the novice, and a work of reference to experienced foresters. But mere manual skill in the performance of the work will be of little avail without the application of a thorough knowledge of the principles of tree growth, and a strict compliance with the requirements of their nature.

If our agriculturists will but apply to the management of their forests the same in-

telligence with which they direct the culture of other farm crops, they will find an equally ready response to their efforts. The farmer who should leave his field of corn or potatoes to shift for itself, or suffer his cattle and hogs to ramble through it at will, would be justly sneered at by his neighbours and punished by the loss of his crop—and trees have no more capacity for self-management than corn or other vegetables, and are quite as ready to profit by judicious culture, and to yield returns corresponding to the care bestowed upon them. They are not liable to be utterly destroyed, as corn is, by the incursions of live stock, but they do suffer serious injury from the trampling and rooting up of the ground. I have seen beautiful groves of oak in Iowa full of dead and dying trees, and, on asking the cause, have been told that the native woods "can't stand civilization," but always die out when cattle begin to run in them; and I am told that, in Kentucky and elsewhere in the South, the young growth is found to contain only the inferior varieties of oak, as the swine running in the woods seek and greedily eat the acorns of the white oak, on account of their superior sweetness. Has anyone ever estimated the cost of raising hogs on such food?

I have endeavoured in the preceding pages, to confine myself to the special features of forest growth which need to be regarded in the effort to develop and improve a native wood, wherever it may be. The planting and culture of an artificial forest is quite another affair, and I have made no allusion to it because my special object has been, if possible, to urge the fact, and arouse attention to it, that we still have vast resources of latent wealth on every side, susceptible of development by proper management, which we are everywhere suffering to run to waste. The work of planting and rearing artificial forests cannot indeed be urged too strongly, and there is no danger of its being overdone. But the conviction of its necessity can be more readily and forcibly impressed upon the popular mind by an illustration of the possibilities of forest culture, when applied to our native woods, than by any other means. The need of further progress by artificial planting will speedily become obvious, and will follow in natural course.

It has been asserted, and with truth, that it is idle for us to establish schools of forestry, because there is no demand for foresters, and consequently no stimulus to the acquirement of knowledge of the theory and practice of the art. It will be time enough to establish such schools, it is said, when we have evidence that there are people who desire to avail themselves of the advantages they offer, and that will not be till there is a demand for the services of those who have done so. This is true, so far as it goes, but the next consideration is, how to create the demand. There was no demand a few years ago for telegraph operators, and when I was a boy there was no demand for railroad employés, for there were no railroads. How was the demand created? By showing the importance of the results. Think of the time and labour expended by Morse and his associates before they could get permission to demonstrate the value of the electric telegraph by a line from Washington to Baltimore. No general interest was felt in the scheme till its advantages were thus made manifest, because there was no *realizing conviction* of its truth. And to-day we are in a similar position in reference to the question of forestry. The impending danger of the diminishing supply of timber is acknowledged by all who are familiar with the subject, but there is no realizing sense of it in the popular mind, and there is a want of confidence in the practicability of any of the proposed measures of relief. The first and most important thing to do, therefore, is to stimulate popular interest by showing what *can* be done. To create a popular demand of any kind, it is essential first to demonstrate the value of its object. The men who are familiar with forest culture, know, as well as Morse knew the capability of the telegraph, that the wealth of the nation may be enormously increased by the proper development of the native woods already standing, but they can point to no evidence of the truth of their assertion, and the fact that it has not been done is regarded as proof of its impossibility. There is no such thing in the country as an illustrative example of what may be accomplished by timber culture, and very few of our citizens who visit Europe can appreciate the works which have there been achieved. They go abroad to study works of art, with the idea that we have nothing to learn in regard to natural productions, and the comparatively small number who grasp the conception of the grand possibilities of development which our forests offer to the exercise of such artificial culture as may there

be seen, can do no more on their return than express their convictions and urge the importance of acting upon them. This they have done for many years past, but they have not succeeded in arousing such a popular conviction of the necessity as should enforce the action of their representatives to the point of making needful provision. The enormous and costly scale on which the work of planting new forests must be undertaken, in order to be effective, seems to throw a damper upon every effort to bring it to pass.

If every owner of a wood lot could be convinced that its value might be enormously increased by a process which, so far from demanding an outlay, would add to his annual income, it would not be long before farmers would consider it as derogatory to their reputation to leave the forests in the wild condition they now are, as they would to have a field of corn presenting a similar appearance of slovenliness. To produce such conviction the truth must be demonstrated in actual practice, and the cost of such demonstration will be but a trifling price to pay for the returns it will bring. Let any State or city select a tract of woodland at some easily accessible point, and put it under a proper course of management, as an experimental forest, and it would very soon excite an interest which could not fail to increase. A portion of it should be suffered to remain in its original unimproved condition. Another part should be improved as "open park," for the best development of individual trees in their fullest natural capacity of dignity and grace, and a third portion should be devoted to the production of timber by the process of thinning, pruning and proper culture. The progress of development could then be seen and watched from year to year in all its stages, and the demonstration thus afforded would touch the interest of every owner of a wood lot. The process would soon begin to be imitated, a conviction of the value and importance of a knowledge of forestry would become established in the popular mind, and the demand for the services of those who had acquired it would lead to a demand for the means of acquirement, and thus the schools of forestry would be called into existence by the natural course of events.

The inauguration of such an experimental or illustrative forest as a means of exciting public interest is surely an object that is well worthy the consideration of legislative and municipal bodies, or of corporations whose interests are connected with this form of national wealth. The cost would be insignificant in comparison with that of planting and maintaining new forests, and the spur of personal interest would incite such general action as would add incalculably to the wealth of every State without further outlay than the cost of demonstration.

It is of course desirable that the experimental forest should be as conspicuous and easily accessible to the public as possible, for which reason the vicinity of a city would seem the most appropriate point. And municipal bodies would be justified in making a liberal appropriation for the promotion of such an object, since it would certainly constitute, for great numbers of people, one of the principal attractions of the city. The beneficial results which would follow, however, would add so largely to the substantial wealth and power of the State that its main support should be derived from legislative rather than municipal action.

It is not, however, my province to discuss the means of effecting the work, beyond this general suggestion.

I have aimed only to convey a conception of the rich resources which nature has placed at our disposal, if we choose to avail ourselves of her offer.

I have made no statement in regard to forest growth which will not be recognized as true by all who are familiar with the subject, and all such persons will endorse my statement that, *practically*, the rules which govern the process are universally ignored.

I have pointed out what I conceive to be the readiest means of awakening public attention and creating such general interest as will insure reform, and leave to other hands the task of arranging the laws which must govern its execution.

By way of illustrating what has been done in re-clothing a denuded district the wonderful results obtained on Cape Cod are worthy of special attention.

EXPERIMENTS IN TREE PLANTING ON CAPE COD.

By Joseph S. Fay, Wood's Holl, Mass.

The soil of Cape Cod is simply and purely *diluvian* or drift, and at best a light sandy loam, with little or no clay anywhere. Yet it has been, no doubt, well-wooded with oak, hickory and pine in the time past, and has now its fair proportion of forest. Formerly this has afforded some ship timber, but of late it has been mainly utilized for fuel, and when cut off for this purpose, the trees have grown up again, to be again cut off at regular periods. Of course, from this there can be no production of timber or lumber. Until the last forty years the keeping of sheep has been inimical to fresh forest growth, but since then that industry has been almost entirely abandoned, and attention has been given to using some of the vacant lands for tree-planting. This has for the most part been done with the seed of the native pitch pine *(pinus rigida)* and seemed for a time to be quite a success. Unfortunately, in addition to the disasters incident to forest fires, carelessly or wantonly set, this pine has become subject to a blight, said to be a fungus, which attacks the foliage of the young growth, spreading and destroying the trees, so that the hopes of the planter have been grievously disappointed. This has been the case also on the island of Nantucket. Experiments have been made quite extensively, within the last twenty years at Wood's Holl, the south-west extremity of the Cape, with the Scotch pine planted from seed on an old worn-out pasture land. So far, the promise is very good, as the blight or fungus which is destroying the pitch pine does not seem to touch it. The tree, so far, appears to be a rapid and healthy grower, but, of course, its value for timber or lumber cannot be fixed for some years yet. It bears a severe exposure, but more trees are broken off by gales of wind than among our native pines, although this may be accidental or exceptional. The native pine seeds have usually been planted by dropping them in light furrows, run six, eight or ten feet apart, according to the supply of seed. If coming up too thickly, the surplus may be transplanted or cut out. They, as well as the Scotch pine, are also sometimes sown broadcast and do well. If done when there is a light snow on the ground in the spring, there is less likelihood of their being sown too thickly. The white pine will not do well where it is likely to be reached by the winds blowing from the sea, as the salt affects the foliage injuriously. Experiments have been begun with the red pine *(pinus resinosa)* which is a desirable tree for any part of the country. Is is very handsome, and is a fair substitute for the southern yellow pine. It deserves attention. The European larch and Scotch birch have been somewhat planted and are doing well. They are hardy and rapid growers. The former are now planted from seedlings obtained at the west. The earlier ones came from England. The latter came from abroad, and are already quite large trees. The Catalpa seems to have done well, and there are some handsome well-grown specimens introduced from the seed some forty years ago, which encourage the more extensive plantings now beginning to be made. From present appearances there seems to be nothing that will reward labour and capital, better than the systematic cultivation of trees on the light lands of this region, the more so as they are of little value for any other purpose. Attention is being more and more given to it.

The economic results obtained in Scotland from forest planting are forcibly presented in the following extract from a paper read by Prof. Wm. Brown, of Guelph, at the Cincinnati meeting:

In Scotland, especially, the re-clothing has been very extensive and successful. Land that fetched only 8d. an acre for sheep grazing, or 1s. for a deer forest, has been under skill and capital, brought to produce a clear annual revenue of fifteen times these amounts —by tree crops.

Beginning in 1855 I planted annually, on an average, for fourteen years, one and a half million larch and Scotch pine, among the heather and granite of Banff and Aberdeenshire.

Our process was simply to enclose with wire fence from three hundred to one thousand acres, in districts where direct shelter, ornament and climatic amelioration, with the best chances of economic results were necessary and most likely to be secured. Drainage was thoroughly done where required. Planting carried out by day labour, never by contract, under skilled foremen, one man, under average conditions as to soil and size of plants, *notching* as many as one thousand a day. Trees were sized according to height and exposure of the ground, and not less than three thousand per acre—aiming at four feet apart all over. Pitting was necessary only with the larger hard and Scotch pine, or with hardwoods. We always had the best success with small plants, seedlings, with conifera on the exposed parts, and not more than two years transplanted in any case.

Thus the Highlands of Scotland are to-day in possession of many thousands of acres, producing handsome revenue that twenty years ago made a poor show on the rent rolls; average cost, £3 10s. per acre.

The importance of establishing schools for scientific and practical instruction in forestry was set forth in a valuable paper read by Gen. C. C. Andrews, at the Cincinnati meeting.

He first stated facts showing the influence of forestry products on the industrial welfare of the country, and the rapid, and in some cases, wasteful consumption of these products without corresponding means for their re-growth. The prosperity of many trades and of vast numbers of artisans depends on the supply of forest products. A school for scientific and practical instruction in forestry would train men for forest management, and would exert an influence favourable to an improved forest economy. There were more than thirty schools of forestry in Europe, and they had proved highly beneficial. One had just been established in British India. There was not one such school in the United States. This country could not afford to be behind the rest of the world in such a matter. The countries of Europe had experienced forest spoliation like what is now occurring in America, and for many years had been trying to repair the evil. One of their helps was the school of forestry. The public forests of Germany and of some other countries now yield a net income of 4 per cent.

The United States are deeply concerned in the question. The way in which the public timber lands had been for the last half century and were still being squandered was a discredit to the administrative character of the country. Where separate States for their school lands or railroad companies for granted lands are getting $30 an acre for timber lands, the United States are either being defrauded of theirs, giving them away, or, at most, getting only $1.25 to $2.50 per acre. The influence of a School of Forestry would help to educate public sentiment up to a more conservative care of the public timber lands; and the United States could as properly grant public land to endow one School of Forestry as they did twenty or thirty years ago to endow thirty or forty Agricultural Colleges.

The first line of telegraph was put in operation by the Government of the United States. It had, in many instances, lent a helping hand to science. While higher education should, as a rule, depend on private support, there were cases where the Government could probably give an enterprise a start, especially where the interests were national, as in the case of forestry, and affected the mechanic arts as largely.

Besides the Government selling timber lands for a totally inadequate price, the report of the Commissioner of the General Land Office showed that, in spite of a large force of detectives, assisted by United States Attorneys and Marshals, at much expense, $100,000 worth of Government timber was annually stolen and carried away.

Assuming that a school of forestry, with a man of acknowledged attainments in science like an Agassiz at the head of it, would promote an improved forest economy, then it seemed clearly the interest and duty of the Government to take the initiative in the matter.

Some of the inducements which might be held out to the owners of land to encourage the planting of trees are suggested by Mr. Renick.

ENCOURAGEMENT OF TREE PLANTING BY-LAW.

By Harness Renick, Circleville, Ohio.

If it is the purpose of the Forestry Convention to solve the question as to the best plan to arrest, as far as possible, the now rapid destruction of timber, and to induce and encourage tree culture, the undersigned, after a long experience and much study of this most important subject, which should engage the attention of every one desiring the best future interests of the whole country, begs leave to say, that in his opinion there is but one practical way to obtain the much desired end, and that is to enlist the pockets of land-holders by *law suasion;* other kinds of suasion have for thirty years past been tried and failed to effect any good in old Pickaway County; and as the sentiment of the community in any one section is pretty much the same as in another, so that suasion other than the pocket, or present self-interest of the land-holder, will *assuredly fail* wherever tried.

The average land-owner is not at all inclined to preserve his timber for the good of posterity. He rather aims to get all immediate, or near prospective profits from his domains in the shortest possible time. He has heretofore, and will in the future continue to cut off his timber just as soon as he believes it will be profitable to do it. Our forefathers destroyed all the timber from necessity, but unfortunately their descendants of this day seem to have inherited a propensity to continue it, even in many cases when it pays them no profit.

To effectually induce timber preservation in some measure, and tree-planting, the States should offer a liberal and sufficient bounty, or an equivalent in tax exemption on all lands planted and cultivated in trees, and also on at least four additional acres to one planted, until the trees were cut off. To exempt from tax only the planted acres would be next to no inducement to plant. And also exempt from tax all woodlands upon which three-fourths or more of the original large trees were standing, and in addition on four other acres to one of the timber lot. And also exempt partially cleared timber lots whereon there remained one-fourth or more of the original large growth.

The lands devoted to tree culture under tax exemption law would generally be of the thinnest and most exhausted soils, of low value, and to exempt five acres to one planted would prove no great encouragement to the comparatively few who would engage in it.

If it is not constitutional in Ohio to enact a bounty or tax exemption law, then, we should educate voters to favour an amendment of it.

The different varieties of trees believed to be suitable or found so by actual experience for planting in various parts of the country and the practical uses to which they are applied are set forth in the papers which follow :—

THE GROWTH OF BLACK WALNUT IN ONTARIO.

By Thos. Beall, Lindsay, Ont.

Some two or three years ago the persons who foresaw the coming scarcity of forest timber in this country, and who had the courage to publicly express their opinion on the subject, were denounced as alarmists, because almost every one believed our timber resources to be nearly, if not quite, inexhaustible. The stern events of the past decade have, however, shown that the fears of the so-called alarmists are already being realized. Immense forests of pine, hemlock, cedar, tamarac, and other varieties of timber then existing have entirely disappeared through the agency of the lumberman. For what he would have left as a reserve for future use, has, in many cases, been destroyed by forest fires. Many of our thinking people now see that the time has arrived when every effort should be exerted, not only to stay the ruthless demolition of our existing timber, but to commence planting trees for the use of our immediate posterity.

As it is now generally conceded that the public domain will, at the present rate of consumption, be entirely denuded of its timber before the end of the present century, perhaps one of the best means to awaken general public interest on the subject will be to endeavour to show that, for those persons who are seeking permanent investment for surplus capital, forest tree planting can be prosecuted with as great, or possibly a greater probability of financial success than attends almost any other sound commercial enterprise.

Judging from our present knowledge of the commercial value of the various kinds of timber best adapted to the climate, and much of the soil of Canada, the cultivation of the Black Walnut offers greater promise for a profitable investment in this industry than, perhaps, any other kind. Notwithstanding the opinion which so generally prevails that the Black Walnut is not sufficiently hardy to withstand the extremes of our climate, recent experience has taught us that it can be successfully and easily grown throughout the greater part of the Provinces of Ontario and Quebec, and, probably also of Nova Scotia and New Brunswick, where an alluvial, or a deep, rich, loamy, clay soil can be found. Late spring and early autumn frost does not injure the Black Walnut as it does some other varieties of our forest trees. I have known a late spring frost to destroy nearly every leaf on a row of these trees, and in two weeks after the trees were clothed with a new foliage. The blossom buds, however, were destroyed, consequently no fruit was produced that season.

I have never observed the foliage to be injured by any insect enemy excepting the red-hump caterpillar—notodonta concinna—and only occasionally by it, and this tree does not suffer by the loss of its foliage as many other kinds do. Some four or five years ago, at about this time of the year, one of my Black Walnut trees was completely stripped of its leaves by this caterpillar, and to my surprise, the tree reclothed itself with new foliage before the end of the season so completely that no difference could be observed in its general appearance from others standing near it that had not been injured. The following season this tree appeared to be as healthy as any other.

Severe pruning does not perceptibly injure young walnut trees, and if an accident should happen to one whereby it would be permanently disfigured, standing where it might be desirable to have a perfect specimen, I would advise cutting it down to within a few inches of the ground as early in the spring of the year as possible, and allow the stump to throw out a new shoot from out of its many latent buds in the remaining part of its trunk, and obtain a new tree in this way rather than replace it by another. A few years ago I treated several trees in this way that were about two inches in diameter. In three years from that time these trees were really beautiful specimens, standing from ten to sixteen feet in height.

No amount of heat or cold seem to affect the Black Walnut injuriously. During the summer of 1881 the thermometer on my grounds registered over 90° several times, and on two or three days over 100°, and on one day in January last between 35° and 36° below zero was registered. Yet the trees this season present their usual healthy appearance, and are bearing a fair quantity of nuts.

Several persons in the neighborhood in which I reside have lately commenced to plant walnut trees, nearly all of whom are succeeding fairly well, and when a few nuts have been planted in soil suited to their requirements, fine, healthy, and well-developed trees have been the result. Many trees, however, have been transplanted in hard, dry, gravelly, clay soils, and are not flourishing as the owners thereof expected them to do.

Seeing, therefore, that the Black Walnut, although indigenous to only a very small portion of the extreme southerly part of Ontario, has proven to be sufficiently hardy to withstand the extremes of climate peculiar to the Provinces of both Ontario and Quebec; that vast areas exist in those Provinces where the soil is quite suited to produce its healthy and rapid development; that the peculiarities of its habit to produce new foliage when anything occurs to destroy that already produced, and to produce a new growth of wood from near the root in cases of accidents to the tops of young trees; that the rapidity of its growth equals that of any other tree grown in this country; that its timber equals any other in value, and that the cash value of well-developed timber which may be grown on a given area, is so much greater than any other, I would urge that its cultivation under proper management may reasonably be regarded as the most remunerative employment in connection with the cultivation of the soil.

Dr. John A. Warder said that the walnut grew rapidly during the first years of its growth, but grew much slower after it had attained a certain age. Under favourable circumstances a walnut tree of fifty years growth will measure across the stump twenty-four inches, but if it were brought into the market at that age it was found to be very unsaleable, useful only for plain work, for chair legs and trifling things of that kind. Its chief character was its great value and great beauty which it gets only in centuries. He recommended the planting of walnut trees, with trees of some variety which came to maturity earlier at the same time, so that some return could be had from the land at once. Although nothing would grow under the branches of the walnut, they might grow up together.

THE EUROPEAN LARCH—*Larix Europea.*

By David Nicol, Cataraqui, Ontario.

There are three other species of this tree; one is a native of America, one of Siberia, and one of China.

Between the European and American larches there is so little difference in their characteristics when young that they can hardly be distinguished as two different species, though in their growth and quality of their woods there is a remarkable difference.

In the American, Larix pendula (Black Larch, Tamarac), the branches are stronger, the bark more inclining to yellow, the scars more slender and clustered, the leaves are more slender, narrower and more glaucous, and the outer ones of each bundle shorter; cones only one-third the size, blunt, with scales scarcely exceeding twelve in number, thinned, more shining, retuse, emarginate, wings of the seeds straight, more oblong, narrower and, together with the seed itself, of a more diluted gray colour.

The European Larch is a quick growing tree, which rises to the height of sixty feet. The branches are slender and generally drooping, the bark of an ash gray colour, the leaves a little wider, bright green, all nearly equal, commonly more than forty in a bundle. The male flowers appear in the month of April in the form of small purple cones; afterwards the female flowers are collected into egg-shaped, obtuse cones, which in some have bright purple tops, but in others are white. This difference is accidental, for seeds taken from either will produce both sorts. The cones are one and one-half inches long, with over thirty woody, striated, rounded entire scales; under each scale is lodged a brownish gray seed, with two subtriangular wings somewhat bent in; tree generally grows perfectly straight.

No tree better deserves our attention than the larch, for it is one of the most valuable, which brings to the planter the quickest returns, with the most certain profitable results.

It possesses many valuable qualities, succeeds in almost every climate, thrives well on poor land, and is certainly destined to become a blessing to the nations that adopt it.

In countries where it is plentiful, its wood is preferred to all kinds of pine for almost all purposes; for shipmasts, yards, booms, and gaffs, nothing excels it, and in Europe it is extensively used in shipbuilding; for door and window-frames it is well adapted because it does not shrink or warp. Joists and rafters made of it support an almost incredible weight, for it is exceedingly strong. Under water it becomes almost petrified and lasts for centuries. In Venice the piles on which many of the houses were built many hundred years ago, are said to be as fresh as when first put in; for canal lock gates, no wood is equal to it. The wood varies in colour according to age—that of the young trees is nearly white; as the trees grow older the wood becomes red, and is much used in Switzerland for furniture making. Shingles made of it are more durable than cedar or pine, the resin which it contains is hardened by the air and becomes a smooth shining varnish which renders them impenetrable to moisture. For ornaments or farm fences, hurdles and gates, it is particularly suitable, because they can be made lighter and more durable than of any other kind of wood. In Italy it is used for carriage building, for wainscoting, panelling, and flooring. No wood takes paint better. It resists the bore-worm, and wherever strength and durability are required, larch timber is admirably adapted. A valuable product of the larch is Venice turpentine, which exudes spontaneously from the bark, but is more

commonly obtained by boring a hole in the tree and inserting a pipe ; this turpentine has always been considered useful in chronic rheumatism and paralysis, gravel-complaints, scurvy and pulmonic disorders.

The larch, when allowed plenty of room, makes a very handsome ornamental tree ; its grand habit, with bright green foliage and purple flowers makes it exceedingly beautiful. Placed on lawns surrounding the country villa it has a remarkably fine effect ; being perfectly hardy it is never injured by severe weather.

PROPAGATION AND CULTURE.

Though the cones are at their full size in autumn, they are not quite ripe until the beginning of winter, which is the best time to gather them. The seeds in their cones will remain good for years, yet out of their cones they lose their vegetating quality in a few months, therefore, as soon as they are out of the cones, they should be mixed with dry sand and kept in bags or boxes until the season for sowing, which is as early in spring as the ground will permit ; when the cones are exposed to the sun a few days the seeds are easily threshed out. They should be sown in finely made beds of sandy loam, and covered with nearly half an inch of fine compost mixed with sand. If kept moist by gentle watering, they will begin to appear in four or five weeks ; they must be partially shaded, because when newly up they are very tender, and a few hours of the full sun would completely destroy them. The following spring they should be pricked out four or five inches apart in bed or in rows ; in the succeeding spring they should again be transplanted at wider distances, in rows three feet apart and fifteen inches apart in the row, and allowed to remain two years, by which time they will be four to six feet high, and of the proper size to transplant in exposed situations.

In favourable situations, when they are well protected, they do better when planted of smaller size, say three years from the seed, they start more freely and make more rapid progress. Experienced planters have long ago decided that the larch should be planted entirely by itself, because of its quick growth it soon outgrows all other trees, and when scattered thinly throughout the forest, the tender top shoots are apt to be damaged by high winds ; they do best when planted thickly because they shelter one another ; they are often planted as near as three feet and some times as near as two feet, but I would prefer the former distance ; planted at this distance they rapidly shoot up straight, clean, and healthy. At three feet apart an acre contains about 4,900 ; in this state they should be allowed to remain six or seven years, when they will have attained the height of twenty feet, if they have been well cultivated the first three or four years ; they should then be thinned for the first time by taking out every alternate row, the thinnings make the best quality of hop-poles, worth at present about five cents apiece—2,450 poles at five cents brings $122.50. Then being allowed to remain in this state about three years longer, they should have the second thinning. By taking out every alternate tree in the row, this would leave them six feet apart each way ; the thinnings are now five to six inches through, and are worth ten cents apiece for boat masts and yards, supports in mines, etc.—1,225 spars at ten cents brings $122.50. After growing five years at this distance they should be finally thinned out to twelve feet apart ; the trees will now be seven to ten inches through and over thirty feet high, can be sawed into rafters, fencing, flooring, etc., and are worth at least twenty-five cents apiece—612 spars at twenty-five cents brings $153. Now, if we suppose that the sale of poles and spars would be sufficient to defray the expenses of making and upholding the plantation, and that each tree still remaining on an acre, say fifteen years after planting, is worth only twenty-five cents, the value of 612 trees is $153, there would be a handsome profit after allowing $2 a year for rent, which for fifteen years would be $30, and a great deal of land suitable for growing the larch would not rent for more than half that amount. Now the expenses cease, because the forest can be pastured with sheep without danger of injury to the trees ; the increase in value is now much more rapid, the annual increase of the circumference of the trees will average one and one-half inches until they nearly reach maturity, which is in about fifty years after planting. The trees will then average thirty to forty inches in diameter, three feet from the butt. Each tree will produce about 450 feet of lumber at $25 per

1,000, $11.25, less expenses for drawing and sawing $2.25. It would surely not be considered extravagant to value each tree at $9—612 trees at $9, $5,508, less thirty-five years rent at $2 per acre, $70 from $5,508 leaves a net profit of $5,438. Be it observed that plantations of larch do not impoverish the land, but rather improve it. The annual deposit of leaves gives more nutriment to the soil than is taken from it by the trees.

Larch in its green state is almost incombustible, so there would be but little danger of destruction by fire, and there would be none if the dead branches were taken away.

A man would have to begin planting when young in order to realize the profits of a plantation, but he can, by planting soon, add much to the value of his estate and the investment would probably be as safe as in bank stock. The price of lumber now is more than twice what it was fifty years ago, and there is every reason to believe that it will double in price before another fifty years has gone.

There are thousands of acres of land in Canada and in the United States which cannot be converted into arable land—an acre of which would give but poor summer maintenance for a goat—if judiciously planted with larch would soon become the most valuable lands in the state, and would add immensely to the wealth of the nation.

THE WHITE ASH.—(*Fraxinus Americana.*)

By Arthur Bryant, Princeton, Ill.

Of the six species east of the Rocky Mountains, the white ash is the most useful for all purposes where strength, lightness and elasticity are required, as notably in the manufacture of agricultural implements. When this tree grows rapidly, as in favourable soil and climate, it affords the best timber, but where it is stunted in growth, as in Southern Russia, it is of a weak and brittle texture. In planting the ash with a view to the production of timber, the trees should be grown thickly while young, in order that they may take a clean, straight stem. When of proper size the trees may be taken from the seed bed and planted in rows four feet apart and two feet apart in the rows. They may be easily transplanted, after which they should be kept well pruned of side branches up to near the top. From three to four hundred trees are probably as many as can be grown to maturity upon an acre. The blue ash is rarely found east of the Alleghanies. It sometimes reaches the height of seventy feet or more, and is distinguished from other species by the quadrangular shape of the young shoots. The bark on old trees is not furrowed like that of the white ash. The black ash is usually found in wetter soils than the other species, whence it is often called swamp ash, or water ash. The wood is very elastic and divides easily into thin strips, which are used for coarse basket work, and for the hoops of barrels, for which latter purpose it is the most economical wood that can be procured. The red ash is common in Pennsylvania and Virginia, and possesses similar qualities to the white ash. The green ash is a small tree, seldom reaching middle size. It is found on the banks of rivers, and is more common in the Western than in the Eastern States. The properties of the wood are similar to those of the white ash. There is another variety called the Carolina water ash, found in the swamps of the Southern States, which has no very special merits.

THE RUSSIAN MULBERRY.

By D. C. Burson, Topeka, Kansas.

The American people, as a nation, have a pre-disposition for quick returns, no matter in what branch of industry or business it may be ; consequently it sounds too much of the dim distant to talk of planting forests for the benefit of "nations yet unborn." But if we can picture groves of beauty and use, bringing dollars and cents to the present generation, they will grasp it at once. Consequently it is our duty to urge the planting of quick growing, hardy, useful trees. And such a tree is now coming into great notoriety on our western prairies. I refer to the "Russian Mulberry." It was first brought to

this country by Menonites from Western Russia, and as near as I can learn through E. H. Rondebush, of Topeka, who got a quantity of the seed direct from Russia last season, it is a cross between the Morus nigra, or black Mulberry of Persia, and the Morus Tartarica, a native Russian variety. It is a rapid grower, and stands transplanting almost equal to the cotton wood, but its great superiority over the cotton wood is that its timber is valuable, the tree ornamental, and the fruit useful. The timber is used in the manufacturing of cabinet-ware, and for durability as a fence post it is not surpassed even by the Catalpa, or Red Cedar. It commences bearing at two years old, and is very productive. The fruit, which is about the size of blackberries, has a sub-acid, sweet taste, and is used for dessert; it also makes a pleasant light wine, and the leaves are largely used for silk worm food. As to the rapidity of its growth, trees, the seed of which were planted seven years ago, are now 25 feet in height, and from six to eight inches in diameter. They grow to be very large, often sixty feet high, and from three to four feet in diameter. So, I firmly believe, that after taking into consideration the certainty of growing when transplanted, the rapidity with which it grows, the value of the timber when young, the usefulness of the fruit for the table, and the leaves for silk worms, we have no tree of more value—the Catalpa excepted—for our Western prairies, both for present and future generations, than the Russian Mulberry.

THE POPLAR FAMILY.

By Prof. Sereno Watson.

The genus *Populus* stands at the head of all our deciduous trees in one respect. It is the only one that ranges over our whole area, from the Atlantic to the Pacific, and from the Gulf and the Mexican boundary to British America. The willows, alders and birches extend across the continent—but only as shrubs between the Mississippi and the Sierra Nevada. The oaks and buttonwoods also reach the Pacific, but only through the southern tier of territories. There is not a state or territory in which some one or more of the species of *Populus* may not be found at home, and attaining the dimensions of a respectable tree. This fact speaks for itself, and need not be dwelt upon.

Unlike the much larger genus *Salix*, the members of which are all popularly known only as "Willows." the kindred genus *Populus* is as generally divided into three groups, the "aspens," the "cottonwoods," and the "poplars." This division has, in fact, a scientific basis, and in the consideration of our subject, we cannot do better that to accept this grouping. All are characterized by a resemblance to the willows, to a greater or less degree, in their fondness for water; the readiness with which they are propagated by cuttings, the rapidity of their growth, and the light and soft quality of the wood.

The aspens have smooth or smoothish bark, an ovate leaf with a flattened stem, which causes its perpetual quivering motion in the wind, and a narrow seed-pod and minute seed. They also are the least in size, rarely exceeding a height of fifty feet. We have two species, the "Quaking Asp" (*Populus tremuloides*), and the "Large-toothed Aspen" (*P. grandidentata*). A third species, (*P. heterophylla*), also technically belongs here, though it has rougher bark, a round leaf-stalk, and becomes a somewhat larger tree. The two latter are confined to the Atlantic region, from the Alleghanies and western New England to the Mississippi. The Quaking Asp, on the other hand, is of very wide range, extending from the Arctic zone to all our northern States, to New Mexico, Nevada, and California. In the western mountains it is found reaching an altitude of 10,000 feet or more. It is peculiar in its habits, growing usually in dense groves in moist valleys or on mountain slopes, to the exclusion of everything else, the straight, smooth, slender trunks very uniform in size, though never large. In the newer territories its long, straight poles are sought for fencing, and notwithstanding the general poor repute of the wood of this genus for out-door uses, they are said to be more durable than pine.

The cottonwoods are larger trees, with rough cracked bark, the triangular leaves with a scalloped margin and flattened stalks, and the much broader pods with larger seeds. Their range is southern, scarcely passing to the north of lat. 42°. The species as

at present recognized are two, the "Necklace Cottonwood" (*Populus monilifera*), and "Fremont's Cottonwood" (*P. Fremonti*). The first is eastern, probably not reaching the Rocky Mountains; the other extends, in two or three varieties (which may possibly be distinct), from California through Nevada, Arizona, Utah, and New Mexico, to Colorado. They are found upon the borders of streams, and not to any great altitude in the mountains.

The poplars, finally, are still larger trees, with thick and deeply cracked bark, the heart-shaped or lance-shaped leaves, on round foot-stalks and slightly toothed, the pods and seeds large, and the buds copiously coated with resin. These are northern trees, and we have three species. The Balsam Poplar (*Populus balsamifera*), ranging from our northern States to Colorado and Montana and northward. The Narrow-leaved Poplar (*P. angustifolia*) in the Rocky Mountain region, and the Hairy-fruited Poplar (*P. trichocarpa*) in the Pacific ranges, from California to British Columbia.

We have here, therefore, a family of trees, which, in its several members, is adapted by nature to almost every extreme, whether of latitude, longtitude or altitude, that our country affords. Taking this in connection with the extreme ease of their propagation, and the usual rapidity of their growth, and we have the main reasons for considering these species as the surest, readiest, and often the only resource in forest culture over large portions of our territory.

Though in general found in the neighbourhood of water, yet this is not essential, as they will grow with vigour wherever there is a damp substratum within reach, and wherever any other tree will live. Nor is a rich soil needed for them. On the high treeless plateaus of Washington Territory bordering upon Idaho, a growth of aspens often springs up voluntarily when provision is made against the usual autumn fires, and the poplar is the tree that is planted in taking advantage of the territorial laws favouring tree culture. In Utah, upon the dry slopes bordering the desert, the Mormon colonists plant the cottonwood and poplar with success. And on the wind-swept plains of Kansas, I am told that in the shelter of a mere furrow turned up across the prairie, there will soon spring up a line of young cottonwoods marking its track.

And, moreover, for their economic uses these trees are not to be despised. They afford a very fair fencing material, considering its quickness of growth, and therefore ready replacement. They afford a good quality of fuel, burning freely and giving a strong steady heat without smoke or snapping. The quality of the wood varies to some degree in different species, but in general the lumber which they furnish, though not suited for exposure to the weather, is well adapted to indoor uses, enduring and sufficiently strong. It works well under the plane, and from its lightness, softness, and fine even grain is excellently suited for many minor purposes. The use of the wood in the manufacture of paper-pulp is well known.

Again, for ornamental purposes the value of this family is not duly appreciated. Some varieties have long been cultivated here and in Europe, but there are others which are more worthy of it. None of the western species have, I believe, been planted at the east. They differ considerably in their habit of growth, but all in their place are handsome trees, and deserve a more general introduction. No more noble tree is grown by us than the true Balsam Poplar, as it is seen in the mountains of Montana, with its straight, clear, massive trunk, gray and deeply furrowed, and a hundred or a hundred and fifty feet high.

The objection that may well be made to the cottony clouds with which they fill the air in the fruiting season is readily avoided by the planting of only the staminate form.

I have thus briefly called your attention to this important group of trees, confining myself, as I suppose was intended, to our native species; and I have done this the more willingly as I am confident that they are better in every respect, and for any purpose, than any foreign ones that can be introduced.

BLACK OR YELLOW LOCUST.

By John S. Hicks, Roslyn, L. I.

The locust takes its common name from its resemblance to the ancient locust mainly in the form of its leaf; and its botanical, *Robinia pseudacacia*, from its being introduced into France by either John Robin, gardener to Henry IV. of France, or his son, Vespasian, about 1601. It must have been taken from Virginia.

All evidence seems to point to Virginia as being the place of its most natural growth.

There are locust trees on the lawn of Daniel Bogart, at Roslyn, L. I., that were brought by Capt. Sands from Virginia, over a hundred years ago. I think there are but two kinds of the locust generally known: the black or yellow locust and the white locust.

The yellow locust may vary much in different localities and soils—some darker in colour than others—and this fact has also undoubtedly given the name of green locust. The yellow locust is the only one of value.

The white locust, the bark of which is much smoother, has more sap-wood and the heart is of a silvery whiteness. It is of little value, either for strength or durability, and I think, as this variety is easier grown from seed, that it is often planted in place of the yellow.'

The trees of the yellow locust usually grow forty to fifty feet in height—occasionally ninety feet. After getting this size it grows very slow, and it is not profitable to graft to the larger sizes.

The young trees have sharp and strong prickles. These disappear largely after the tree has a growth of three to four inches, although the small branches always have some. It does very well on yellow sandy soils, and in yellow sand banks, with no alluvial soil covering the sand, it will often grow spontaneously; in heavy clay soils it often proves a failure. The fact that it will grow profitably upon soil that will not produce pasture or grow other trees of value, and after the trees have grown a few years, induce, by its shade and rich falling leaves a good growth of pasture, makes it the most valuable tree that is grown for profit. This also will make many unsightly spots beautiful and dreary hillsides profitable. The roots usually run near the surface of the ground and extend to a long distance.

It is now being largely used in re-foresting the desolate regions of Austria and Hungary—localities that have been made desolate by having the former forests destroyed. It thrives well in these countries, growing in thirty years to twelve inches in diameter. It grows well in portions of all the middle States, southern parts of the northern States and northern portions of the southern States. Some localities have attempted its growth and after the appearance of the borers abandoned it. While it often survives them, and sometimes if cut off after the borers have attacked it, the second growth thrived well.

The delicacy and lightness of foliage distinguish this from all other trees of cultivated wood-land, while the colour of its leaves, so different from others, makes its presence known at a long distance. The rugged character of rough bark, its singularly light and graceful foliage makes it a marked tree of peculiar beauty. Its leaflets are arranged in opposite pairs along the mid-stem, somewhat similar to the mountain ash. It is late in coming into leaf, and goes early in autumn; but in the perfection of its verdure no other tree rivals it.

The foliage is very fertilizing to the soil, causing the grass beneath to be always green and luxuriant. Its white and fragrant flowers appear in May and June. Tradition says the American Indian made the gift of a bunch of its flowers a declaration of love. The nightingale and other small birds resort to the protection of its thorny branches. When dry, the wood weighs 54 pounds to the cubic foot, green 62; by tests made at Brest and in the Woolwich ship-yards it was found to be about twice the strength of British oak. It is used largely in making treenails for fastening planks to wooden ships, for top timber and beams of vessels in exposed places. The most universal use is, however,

for fence posts and beams of cellars, or sills of exposed buildings; it has been known to last forty to sixty years as fence post—the writer knows of posts not over three inches in diameter that have been in use thirty years. Hough's Report on Forestry mentions its lasting fifteen to twenty years as railroad ties, while oak lasts only five to ten years, and chestnut six to eight years. The timber is used very extensively by carriage builders, and in some instances in preference to hickory. Brewster & Co., of Broome St., New York city, using it, and paying higher prices for it than for hickory,

On Long Island, near New York city, this tree is the most valuable grown. After thirty years' growth the tree will make posts eight, ten, and twelve feet long, three to five inches in diameter at the small end. In New York city the posts are worth, for 8 feet in length, 4 inches diameter, 48 cents; 10 feet, 4½ inches diameter, 77 cents; 12 feet, 4¾ inches diameter, 95 cents; 6½ feet fencing post, 4 inches diameter, 28 cents. The trees will often cut one piece or stick 12 feet, 1.10 feet, 1.8 feet, 1.6½ feet, making $248 per tree; these are the wholesale prices. In the most famed localities, and with five or ten years more growth, the tree will make, say one stick, 16 feet, 36 inches girth; 1.12 feet, 30 inches girth; and 1.10 feet, 25 inches girth, this making the tree worth $500 to $700, on the basis of 60 cents per cubic foot; it has sold in the past as high as $1.50 per cubic foot. As to value in other localities, Dr. Warder states that he is cutting trees having a growth of 24 years, averaging 12 inches diameter, and 60 feet high, trees making eight to ten good fence posts, 7 feet in length, 6 to 8 inches face at the top end, trees standing 400 to the acre.

Ezra Sherman, of Preston, Ohio, states that locust seed planted in 1830, three years afterwards the trees were planted in a grove of 15 acres, also an avenue of 200 rods. In 1870 two-thirds of these last were cut, 180 trees making 1,500 posts, worth 35 cents each, or $525, and Mr. Sherman says that the fifteen acres will furnish fence for the farm of 1,500 acres for all time, and that the pasture, together with stakes and poles for fencing, furnished from time to time, will pay as good interest as the open land would.

Waldo F. Brown, of Oxford, Ohio, states that the planting of locust is the best investment a young man can make, that the seeds should be planted in rows, and the seedlings transplanted in rows four feet apart, when one year old. When large enough for fences, stakes, and bean poles, cut out three-quarters, leave them, when five to seven years old, eight feet apart; as soon as the trees are out of the way of cattle, sow blue grass, as this does not injure the trees, and grows well, the pastures paying interest on the investment after five years.

As the trees send up suckers as well as sprouts from the stump, the growth is always increasing, and is thicker after such cutting. In France it is much grown for vine supports, and is sometimes cut every four years; the leaves being used for cattle food same as hay. In 1826 premiums were offered by the Massachusetts Society for Promotion of Agriculture for the promotion of its growth, and the extirpation of the borer.

The *New England Farmer* states the growth to be 300 to 600 posts to the acre, worth 50 cents each, besides the growth of pasture, and that the Government pays 75 cents per cubic foot at this time, 1826.

The *New York Cultivator* says, "1,210 trees grow to the acre, and that trees grown 28 years produce two to four posts each, and that trees grown from suckers or shoots are not so much inclined to seed, nor do the borers affect them as severely."

Allen Furnas, of Danville, Indiana, states "that he has grown the black locust over 20 years, and has had very little trouble with the borers; that it grows thrifty, making good fence posts in 10 or 12 years, and three to six posts in 18 to 20 years, growing 1,000 to the acre at eighteen years; the trees are worth 75 cents each. The timber will last an average of 35 years; grows well on poor soil."

In the years of 1828 to 1838 Joseph Hicks planted at Westbury, Long Island, on each side of the highway leading through his farm for about a quarter of a mile, locust trees, about eight to ten feet apart. The trees were gathered from different parts of the farm, where they had grown up from the roots of other trees; thus grown and planted with but little expense. When first planted the top was entirely cut off, they growing much better from this treatment. After thirty years of growth, and at least fifteen years of the most beautiful shade in the heat of summer, and an abundant growth of grass be-

neath, they were then sold for $500 as they stood, and now three trees are growing in the place of one, and as thrifty as the first crop.

It is thus seen that this tree grows in the most of our middle and western States, and will grow in many sections where it is not now known, and some, where it has once been condemned, the second trial will prove its value; the borers travelling some seasons and not others. It is worth the thorough trial anywhere, being the most valuable of our timber for durability, growing on poor soil where other trees will not grow, nourishing an abundant growth of grass, and finally, when cut, will send up twice or thrice the number of young trees. What tree can be, or is, of more value for forestry culture?

PROFIT OF DURABLE TIMBER.

By A. Furnas, Danville, Indiana.

Interesting as the growth of timber may be to all of us in its various relations, and while wide and extended its results may be, involving the beautiful in nature, the useful in art, controlling the elements as well as imparting sanitary influences; yet there is extant a feeling akin to belief that there is nothing real in it, that it is a sort of rocking chair speculation, very nice on paper, and represented in diagrams where all trees stand like so many posts or sentinels just where they were placed, and represent precisely just so much controlling influence, æsthetic, sanitary, or financial.

All new enterprises that contemplate an innovation on long-established usage, be they ever so wholesome, unselfish, charitable, or benevolent in their design, meet with sceptism if not outspoken opposition; and what is most remarkable, this spirit of unbelief emanates most frequently from those whom such proposition is designed to benefit or elevate.

However, my little paper is to deal with *facts* and *figures*, which, together, mean *stubborn truth*, and if I fail to show the practical value of durable timber, you will be left the alternative of deciding whether the fault is with me or my subject.

I shall confine my investigation entirely to the catalpa and locust, and assume without argument their great durability as well as the unlimited demand for such timber.

Much of the cost of timber grown by cultivation depends on the price of land on which it is produced. Assuming the average price of land away from the neighbourhood of cities and villages to be fifty dollars per acre, which would be a high estimate for us in Indiana, and the cost of catalpa plants set four feet apart each way, making 2,722 per acre, at a cost of $5 per 1,000—(I grow my plants and they did not actually cost half that figure)—we have thirteen dollars and sixty-one cents for plants. But the ground must be prepared for the plants, and the transplanting is rather tedious work, hence we will allow $11.39 for preparation of land and transplanting, making investment in plants and labour, $25 per acre. Total investment, $75 per acre. In Indiana lawful interest is 6 per cent. Now let us compound this amount for ten years, and we have principal and interest in round numbers, $134.30. To this we will add $5 annually for four years for cultivation. With us the renter never pays taxes, but we will add that which would be about $5. To this add $5 annually for keeping up fences and contingencies, and we are debtor:

To cost of land and plants compounded for ten years	$134.30
" cultivation four years	20.00
" fence and contingencies, tax, etc.	50.00
Total	$204.30

At the expiration of ten years we propose to remove one-fourth of the trees, which, if all are standing, will be 680, for which we may claim credit. Many of these by this time will make from one to two good fence posts, and at the lowest wholesale price in carloads would be worth 20 cents each. At an average of 20 cents per tree, we have $136, to say nothing of the tops for fence stakes and fuel, all of which will be consumed on the

farm. This reduces our debt to $68.30. This we will compound for two years more, and we are debtor to $76.73. At this time, twelve years from setting, we propose to remove one-half of the whole original number, which gives us 1,360 trees. These, at the very lowest estimate, are worth 25 cents per tree, or $340 for the lot; from this amount deduct our indebtedness, and we have a credit of $263.27. We will now compound this for four years more, and our credit is $332.35. To this amount we will add $50 for the land charged to us sixteen years ago, and as it is none the worse we will take it at its former appraisement. This further increases our balance to $382.35. Now we propose to close the account, and sell the one-fourth yet remaining—680 trees. These are worth a dollar a tree; from this, however, I must deduct the interest on the land for the last four years, which is $13.12. That leaves a net profit of $1,049.23. But suppose I am told that my last lot of trees are not worth a dollar apiece. To this I reply that I know of quite a number of *Catalpa speciosa* about that age, and for all such trees well-grown and within twenty miles of my farm I will give a dollar each and go after them. The catalpa in University Square, Indianapolis, have been set about sixteen years, and average one foot from the ground about one inch in diameter for every year of growth, and notwithstanding they have not been crowded so as to give them the most desirable shape, yet, if the city authorities wish to dispose of them I will take them at the above figure and be glad of the chance. Of course $25 would not move one of them, but as this is not their commercial value it cannot be used as a basis of calculation.

Forty years of experience as a tree-planter has taught me that trees do not always grow where they are set precisely as desired or indicated; but, as the catalpa transplants with a remarkable degree of certainty—even growing without roots—I believe on good ground it is within the scope of practical demonstration to realize three-fourths of the result above indicated; but should one-half be attained we have $524.61 as the return from one acre of land for sixteen years, and all this with very little labour or expense after the setting and three or four years cultivation at the beginning, after which they require no further care.

As to the question of the commercial demand I have no idea that it can be supplied in half a century, but so far as I am concerned with my little plantation it is for the necessities of my own farm. Every farmer should have a few acres of well-grown catalpa or locust from which to draw for the thousand and one demands of the farm. If we fence at all, I believe the coming fence will have posts. Just what this fence will be I cannot say; it may be boards, iron, steel—at all events it will require *posts*, and these posts should be as durable as possible, and catalpa being the best now known for that purpose will be in demand. But as I promised not to argue the demand for durable timber, allow me to refer to the demand for railroad cross-ties, piles for trestles, bridges and embankments, as well as telegraph poles, all affording an immense field for the use of this wood.

I have occasionally referred to the Black Locust. I am aware that it is not reliable in some sections of the United States; especially is this true of most of our western prairies, but in the timbered regions it generally succeeds, and on my own farm in a small plantation made some twenty-one years ago I am now realizing an actual profit, clear of all expense, of over $400 per acre.

There is a mystery about the growth of the Black Locust which I do not understand. I saw beautiful, thrifty, isolated specimens of it in southern Kansas and the Indian Territory, but wherever it had been set in quantities in the places above named it had in every instance been destroyed by the borer, and yet fifty or sixty miles south of Baxter Springs in Kansas, it is a beautiful forest tree with a body often fifty to sixty feet in length.

There is another feature of timber culture for profit which I have not mentioned, and that is the supply for those vast western prairies where land can be had for the planting, and in some instances, I believe, an exemption from taxes if planted to timber. The field for enterprise here is incalculable, the demand without limit, and yet the investment comparatively trifling. It is true the risks are more and greater. These are mainly drouth, grasshoppers, and fire.

The catalpa where fairly established might pass through a season without rain, but should the drouth immediately succeed the setting, the result would most likely be a total

failure. You cannot frighten a western man by saying "grasshopper," half so much as you can by "chinch bug." And yet on the theory that what has been done can be done again, we may at least be entitled to the benefit of the doubt. The grasshopper has in many cases devastated the whole country, and may do so again, and yet there is a sort of feeling of security among the western farmers which plainly says the grasshopper will not trouble us any more. Fires also do much mischief in the new prairie country. But as the prairie is broken, and the land brought under cultivation this trouble is no more liable to the west than in the older States, and this objection will be entirely removed. A number of Kansas men assured me that the grasshopper would not eat the catalpa, but as I have not heard this idea broached as a trueism, it should be further confirmed before being accepted. However, I have seen the catalpa at Kansas City, Fort Scott, and elsewhere in the State of Kansas, which had passed the grasshopper raid, that looked remarkably thrifty and nice. At all events, in view of all the drawbacks of this country, if I were a citizen there I would plant catalpa. I would not invest everything in it, nor would I make my plantation all at once. A few acres set each succeeding year, and on its rich soil, genial clime, and usually productive seasons I should confidently expect success four seasons out of five, and upon this ratio, with the extraordinary timber growth there so far outstripping anything we can do in Central Indiana, in a decade of years I should confidently expect more satisfactory results there than with us.

If this hypothesis be correct, the inducements to plant the catalpa on the western prairies are stronger and more numerous than with us, because the investment on those cheap lands would be comparatively nothing, while the demand for such timber must be greater than with us, as the country becomes more populous.

Thus, gentlemen, I have endeavoured to present the actual results of timber growth mostly on my own farm, which makes a good showing on the profit side, and that is all that I intended to do.

A NEW CATALPA.

By John C. Teas, Carthage, Mo.

The consumption of timber and the destruction of our forest trees are going on at such an alarmingly rapid rate, that public attention is becoming somewhat awakened to the importance of some measures for providing a supply for the future.

Of all the trees that have been suggested as adapted to the formation of timber plantations, the Catalpa stands pre-eminent. Its exceedingly rapid growth; its adaptation to almost all soils and situations; its wide range of latitude, extending from Canada to the Gulf of Mexico; its extraordinary success on the Western and Northwestern prairies; the ease and certainty with which it is transplanted; its strong vitality and freedom from diseases and insects; the incomparable value of its timber for the most important as well as minor uses for which timber is needed; the almost imperishable nature of the wood when used for posts, railroad cross-ties and in other exposed situations; its beautiful grain, and the high polish it bears, adapting it for furniture and fine inside finishing work, to say nothing of the handsome and stately appearance of the tree and the unrivalled beauty of its flowers, all point to the catalpa as the tree to plant.

[These remarks apply to the hardy, western, early blooming *Catalpa speciosa*, and not in any degree to the common catalpa (*bignonioides*), which, unfortunately, is the one usually met with in cultivation.]

A NEW VARIETY—OUR OWN HYBRID, AND HOW IT WAS PRODUCED.

In the year 1864, having already growing all the varieties of Catalpa then generally known to cultivators in this country, viz.: the common, the *speciosa*, the *Kœmpferi* and the *Bungei*, I procured from an eastern nursery, a tree under the name of "Japan Catalpa." Before I had become well acquainted with this new tree, I left my old home in Indiana and came to Jasper county, Mo., where I have since lived, and did not again see the tree for ten years. Two or three years after leaving the old place, I sent back for

catalpa seeds, and among the plants grown from these seeds were a few (perhaps the product of a single pod) quite unlike any catalpa I knew, and showing so many points of interest that I watched them with especial care—believing they must be from my Japan tree, because so different from any of the others. Being unable to identify it with descriptions within my reach, I sent samples of the flowers, leaves, seeds, etc., to eminent botanists, and others skilled in trees, in different parts of the country, and also tried to trace up the source from which the original tree had come. But nobody knew it. The botanists were unable to give me any assistance, and the efforts to trace the origin of my Japan tree only showed that it was grown from seed imported from Japan, without name, other than catalpa.

I have since visited my old place, and a careful examination of the original tree there, its leaves, bloom, seeds, etc., proved, to my surprise, that it is nothing more nor less than the species common in Japan, called by botanists Catalpa *Kœmpferi*, and *quite unlike* the seedlings I had grown from it. There could be but one solution of the difficulty, and that is, that the flowers of this tree had been fertilized by those of the *speciosa*, which grew not far from it, and thus produced, by natural hybridization, this new variety. This idea of hybridization had before been suggested to me by Robert Douglas and others, but I felt reluctant to accept the theory until after I had examined the parent tree.

The characteristics of the new variety are very marked, and partake largely of those of both its parents. In its vigorous, upright growth, it even surpasses them both. Its foliage is large and luxuriant, sometimes regularly heart-shaped, but often having sharp pointed lobes on one side or both, showing great diversity of form on the same tree. The lobed leaves—velvety purple or brown when they first appear—the yellow marking about the throat of the flower, and the early age at which the young trees bloom, all clearly point to the Japan influence in its parentage, while the American is unmistakably shown in the profusion of its large and handsome white flowers, and the very thin sapwood. The seed-pods and seeds are very distinct, and are intermediate between those of *speciosa*, which are the largest of all, and those of the yellow flowering *Kœmpferi*, which are the smallest. It is the most profuse bloomer of all the catalpas, being literally loaded with flowers, and remaining in bloom for several weeks—a much longer period than the others. The individual flowers are the size of those of the common catalpa, not so large as *speciosa*, but this is more than made up by their greater abundance. They are white, with many very small purple dots and a touch of yellow, and are borne in clusters of extraordinary size, sometimes numbering as high as three and even four hundred buds and blooms in one great panicle. They do not all open at once, but keep up a succession of bloom for a long time. The flowers have a very pleasant and delicate fragrance, and a tree in bloom not only presents a magnificent spectacle to the eye, but also fills the air for quite a distance with its agreeable odour.

The leaves frequently attain immense proportions—occasionally measuring eighteen or twenty inches across, and even larger, and ONE MONSTROUS LEAF, carefully measured by Prof. G. C. Swallow, of our State Agricultural College, and myself, was twenty-five inches broad, and eight feet ten inches around the margin, not measuring the stem.

In the spring of 1880 I sent Prof. Geo. Husmann, at the State University, Columbia, Missouri, one thousand very small trees, culls out of the one-year-olds—many of them no larger than small straws. They were set in nursery rows late in May, and though it was a dry and unfavourable season, they made a surprising growth—many of them reaching a heighth of six feet or more, and from one to one and a-half inches in diameter, and straight as young Lombardy poplars. I also sent a dozen larger trees of the same, which were delayed on the way, and he wrote me were as dry as sticks when received, and he thought ruined. However, he planted them, and every one not only lived, but made a good growth.

Small trees planted in village lots, grew without cultivation, in five years, to be twenty-five feet high, and twenty-four inches in circumference at one foot from the ground ; and I measured one shoot in the top of one of these trees, which had grown eight feet in a single season. They have made double the growth of other catalpas alongside, under exactly the same conditions, though the last have made a fair growth.

I have recently examined a grove of about 100 catalpas, of the various kinds, set eight years ago, on a farm which has been occupied by renters, and the trees neglected, and many of them injured and broken by stock. They have consequently not made the growth they would with better treatment, but as all have fared alike, a careful measurement may be supposed to show their comparative rapidity of growth. As in every instance that has come under my notice, the Japan Hybrid has far outstripped all the others. It measured 25 feet high, and 33 inches in circumference, a foot above the ground. *Speciosa* came next, 20 feet high, and 24 inches in circumference. *Bignonioides*, 14 feet high, and 19 inches in circumference. These were all represented by numerous specimens. There were but one or two *Kœmpferi*, and they were small,—probably the result of accidental causes, as it is a good grower. Had these trees been cut, the tops of the stumps would measure in square inches,—the *common* 31, *speciosa* 50, and the *Japan hybrid* 95. Taking the height of the trees into account, the difference is still more apparent.

The well-known character of the catalpa for durability, and the close resemblance between the wood of this and that of its parent, the *speciosa*, leave little room to doubt its being similar to the others in its power to resist decay. As a timber tree it promises to be of the greatest value, and to take a place in the very front rank, on account of the wonderful rapidity of its growth, which equals that of the most luxuriant trees of temperate climates, while its hardiness has been repeatedly demonstrated by its standing uninjured, with the thermometer at twenty-five degrees below zero, showing that it is abundantly hardy for the latitude of Kansas, Missouri, etc., though it has not yet been so fully tested as *speciosa* in the extreme north.

We have grown several thousands of these seedlings, and it seems like being a well-established variety, though, of course, there are some variations in growth, habit, colour, foliage, etc., among the seedlings, but these variations scarcely appear greater or more strongly marked, than are seen in different trees of *speciosa* or *bignonioides*.

While its vigour, hardiness, freedom from insects, etc., recommend this new tree so strongly for timber plantations—the same qualities, added to its stately habit, the magnificence of its bloom, its fragrance and the beauty of its ample and diversely shaped foliage, cannot fail to make it popular as a tree for shade and ornament.

SOME OF THE BEST TREES TO GROW FOR TIMBER IN MICHIGAN.

By W. J. Beal, Lansing, Michigan.

Michigan Agricultural College is located at Lansing, about seventy miles north of the Ohio line. This neighbourhood was nearly all a wilderness thirty years ago. It is not ten years since people rolled up large heaps of logs and burned them to get them out of the way. As a people, in Michigan we are hardly yet "out of the woods."

Our most valuable forest trees found in abundance were Black Walnut, White Pine, White Ash, White Oak, Shag-bark Hickory, Black Cherry, Tulip-tree, Rock Elm, Sugar Maple, and Arbor Vitæ. Of these, White Oak, Tulip-tree, Rock Elm, Arbor Vitæ, Sugar Maple grow too slowly to be desirable trees to plant for growing timber.

I have been Professor of Horticulture in Michigan Agricultural College for nine years, and in many ways have done the best I could to advance agriculture. But little means has been offered for making experiments. Of all the efforts made, I can now think of nothing which gives more satisfaction in proportion to the cost than a couple of acres planted with a large variety of the seeds of trees. The interest in our little arboretum must continue to increase rapidly as the trees become larger and the country grows older.

I will only give you my notes on a few species, at this time.

Except *Populus balsamifera*, I have only some very young specimens of poplars.

In the spring of 1873 I sowed some seeds sent by the United States Department of Agriculture. When three years old, they were transplanted to their present position. They

fruited when six years old, and have fruited every year since. There are only nine trees of this lot now standing in the arboretum. They proved to be *Catalpa speciosa*. They have passed through two very cold winters when the thermometer reached thirty-two or thirty-three degrees below zero. A few of the thriftiest limbs were injured, but the trunks are sound, at least, to all appearance. The trees have had plenty of room, nothing shading them to prevent the tops from spreading. There is quite a tendency in the limbs to split off at the crotches, much like *Ulmus Americana*. These trees, with a growth of nine years, transplanted when three years old, now measure from sixteen to twenty-four inches around at one foot above the soil. Five feet above the ground, two of the trees each measures sixteen inches in circumference. They are a trifle over twenty feet high. They have not grown as fast as *Acer dasycarpum*, Silver-leafed Maple. Some of the latter measure, with a growth of eight years, twenty-two and a half inches around and run up twenty-eight or thirty feet. The tops have plenty of room and are large and spreading. Some White Ash were grown from the seed six years without transplanting. Many of these are eighteen feet high, and from eight to nine and a half inches in circumference, one foot from the ground. From the first the trees have been straight, clean and handsome. Some Basswoods and Butternuts of the same age and with the same treatment have trunks a trifle larger at the base, but they are more tapering and not so tall. Some Black Walnuts have grown five years where the nuts were planted. Many of them are fifteen feet high, and measure seven and a half to eight and a half inches a foot from the ground. They are straight, healthy and beautiful. We are north of the line where many good Black Walnut trees grow in the forest. It is quite safe to plant them on soil where they grow well in the native forest.

My friend, James Satterlee, of Greenville, Montcalm county, lives about one hundred miles north of the Ohio line. On his father's farm were planted some trees of which he writes as follows: "There are about seventy Chestnut trees. The nuts were planted in the spring of 1863, and set in the spring of 1865 from 25 to 30 feet apart, irregularly. They were cultivated with corn or potatoes for five years, then seeded to clover, which remained two years, then they were again cultivated for two years, since which time the orchard has remained seeded. The trees are all healthy. The tallest are about thirty feet; the largest forty-two inches in circumference one foot from the ground, and thirty-six inches, four feet from the ground. There are some Black Walnut and Butternut trees of the same age. The largest Black Walnut is forty inches in circumference, and not quite so high as the chestnuts. The largest Butternut is thirty-five inches in circumference and a little lower than the walnuts. The chestnut trees vary considerably in their productiveness. Some bear five or six nuts in a burr; some bear much larger nuts than others. One tree holds its leaves all winter. This orchard of nut trees is well known for miles around, and is one of the attractions of the neighbourhood which is in a new country."

Of forest trees indigenous to Michigan, all things considered, where the site and soil are suitable, I should select to plant for timber Black Walnut and White Ash. I am *not yet certain* that it would be better to plant European Larch, Silver Poplar, Cottonwood, Silver Maple, Butternut or any other foreign species.

FORESTRY IN MICHIGAN—OUTLOOK AND SUGGESTIONS.

By V. M. Spalding, Ann Arbor, Mich.

It is not necessary to go into an argument to show that Michigan ought to be interested in forestry. Everyone knows what an element the forests have been in our prosperity. According to a late report of the Commissioner of Immigration "the aggregate value of the forest products of this State already mentioned is largely in excess of $800,000,000," and the timber product of a single year, 1879, amounted to $60,000,000, or about thirty-five per cent. of the total value of the natural productions of the State for that year. Michigan produces more salt than any other State in the Union, and the

brine is evaporated by means of the refuse from the great saw-mills in the vicinity of Saginaw and other lumbering towns. Ours is the second State in the production of iron, and the blast furnaces of Ironton, Elk Rapids, and a number of other places are drawing their supply of charcoal for its reduction from the great hardwood forests in their vicinity. The products of these forests are sent to the ends of the earth. Much of the first lumber of the Atlantic cities and of the Old World comes from Michigan pineries. Threshing-machines made in Battle Creek are sold in South America and Australia, and farming implements, furniture, and a long list of articles requiring wood in their manufacture are made in the State and exported from it, their manufacture being a source of support to fifty thousand of our people and their sale a steady source of wealth to the State.

Nor is it necessary to repeat the well-known fact that our forests are rapidly disappearing. The bulletins of the last census, accessible to everyone, show that the estimated amount of merchantable pine timber standing in Michigan May 31st, 1880, was thirty-five billions of feet. At our present rate of consumption, five billions of feet annually, it will take seven years to use up our pine forests. Suppose, however, that the estimates of the amount remaining, although made with great care, are too low; suppose for safety that the pine will last twice as long as has been estimated, the fact still thrusts itself upon us that in a few years this great source of our wealth will be gone.

What are we doing in view of these facts? We are going on with astonishing energy and improved machinery to hasten the end. Every man who can do so is trying to get a piece of pine land, or a quantity of logs before they are gone, and our own people, in company with eastern capitalists, are planning the speedy destruction of the hardwood forests as soon as the pine lands have been stripped. The newspaper articles that charge these things upon us are not sensational. They do not tell all the truth. We have squandered with reckless haste the abundant forest wealth with which the State was endowed, and, besides all this, time and again, forest fires, that might have been prevented, have swept over fair portions of the commonwealth, carrying swift destruction with them and completing the work that the axe had begun.

In the study of this subject then we may as well turn our attention at once to the forests of the future, for it is evident that those of the present will be gone in a few years. Our own legitimate wants and the great profits of the lumber trade have already settled the question for Michigan. If we want forests we must make them.

Without repeating the arguments that have been given so fully by others, I shall assume, what is admitted by everyone who has ever bestowed serious thought upon the subject, that the highest welfare of the State requires the establishment and continued maintenance of a suitable proportion of wood-land. It may be assumed, too, that, in due time, both Government and people, moved by necessity, if by no higher influence, will unite in a settled purpose to secure this. As soon as this attitude is taken by the people of the State, and we are ready to enter upon the work of reforesting, we shall find ourselves face to face with various difficult practical problems. Some of us, perhaps, may render a service by studying these problems now, viz.:—

(1) What parts of the State and what proportion of its area should be covered with forests?

Economists estimate about twenty-five per cent. as a suitable proportion; but this varies with the position, physical character, and commercial interests of the State or country under consideration. The State of Michigan contains large areas that are worthless for any other purpose than raising timber, and still more extended regions that, if not absolutely valueless for agricultural purposes, can be used to far better advantage in growing trees than in raising any other crop whatever. Undoubtedly, the great question with us is, How, in the most direct practical way, can we rehabitate the extensive regions in the central and northern parts of the lower peninsula that have been stripped of their pine forests, and the remaining portions of this region that will so soon be bare? Anyone that has been through this part of the State will remember its desolate and ruined aspect. "The valuable trees were all felled years ago, and the lumberman moved on to fresh spoils, leaving behind an inextricably confused mass of tree tops, broken logs, and uprooted trunks. Blackberry canes spring up everywhere, forming a tangled thicket, and a few scattering poplar, birch, and cherry trees serve for arboreal life, above which tower the

dead pines, bleached in the weather and blackened by fire, destitute of limbs, and looking at a distance not unlike the masts of some great harbour. Thousands of such acres, repellant alike to botanist and settler, can be seen in any of our northern counties."* While there is good soil to be found in this region, much of it is light and sandy, altogether unfit for farming purposes, but it has raised one of the finest forests that ever clothed the surface of the earth, and if it can again be covered with such a forest it will become in the future, as it has been already, a source of almost unlimited wealth.

Another portion of the State will soon force itself upon our attention, unless it is cared for. All along the eastern coast of Lake Michigan sand-dunes extend, precisely similar in their nature, though of less extent than those of the old world, while these dunes are covered with vegetation they keep, for the most part, within their limits, but indications of what they may do, when free from such control, may be seen at Grand Haven, Michigan City, and other places along the shore, where piles of fine, drifting sand are covering railroad tracks, and fences, and some trees, and, in some localities are encroaching upon cultivated fields, to the dismay of their proprietors. The experience of Western Europe is conclusive upon this point, and it is the manifest duty of the State, and of the people, to absolutely prohibit and prevent the clearing away of trees, or even excessive pasturage of such lands, and to encourage, by every suitable means, their reforesting.

The farming lands in the southern portion of the lower peninsula all need a fair proportion of woodland for fuel and shelter, and the great majority of these farms would be rendered much more valuable in a few years by judicious plantations of trees; so, also, the northern peninsula, though still heavily wooded over large areas, already has extensive regions that have been stripped of their forests, and that can be turned to better account for this than for any other purpose. We may safely conclude, therefore, that the State of Michigan requires fully as great, and probably a greater proportion of its area to be kept in wood-land than has been estimated as necessary for other countries; in other words, more than twenty-five per cent. in this State, rather than less, may properly be covered with timber.

(2) What kinds of trees shall we plant?

To answer this question we must know something about the different species of trees, the soil and climate to which they are adapted or to which they can be induced to adapt themselves, what kinds will endure unfavourable conditions best, what trees will grow rapidly, and what sorts are most valuable for timber or other products.

Without attempting to decide all of these questions in detail—many of them requiring not only careful study but long experiment, for which the State makes no adequate provision, as yet—there is one very important question suggested at the outset, and that must be met, whether it can be settled at once or not. The question is, How much significance must be attached to the principle of rotation? It has been commonly noticed that forests of oak succeed those of pine, and *vice versa*. Oak and hemlock forests have been succeeded by those of elm, beech, and maple. When the pine woods in the northern part of Michigan and Wisconsin are cut off, poplars, birches, and the wild Red-cherry spring up, and so, as in many cases, this succession seems to be pretty uniform and constant. There has grown up a half popular, half scientific notion that it must be so, and that, if we are to succeed in reforesting our denuded pine lands, we must follow the order of nature. We have no right, however, to follow nature blindly, and sometimes we can take a short cut while nature is going round a corner. No one has ever formulated an order that governs the succession of forest trees, nor has it ever been shown that there is any such unvarying order of succession. On the contrary, it is one of the most variable things with which we are acquainted, and there is every reason for believing that it depends more upon what the ground is seeded with than anything else. The reason why birches, poplars, and wild Red-cherry trees spring up on our wasted pine lands is that the seeds of these species are carried there by the wind and by the birds, and there is no doubt whatever that other and better trees may, with suitable pains, be made to take their place. When we plant trees about our houses, or along the highway even, if it happen to be new land, we do not stop to make a critical inquiry into the laws governing the

* Erwin F. Smith, "Flora of Michigan."

succession of forest trees; we find out what trees are hardy, and, having settled this point, set out whatever kinds we fancy, with the expectation of having them do well if they are cared for.

(3) Shall we plant the White Pine in Michigan?

The answer may be given without hesitation. Yes; plant it first, and last, and all the time. Give it a fair chance and it will cover the State again. It may be wisdom to substitute some other species on those tracts that have just been covered with a heavy growth of pine, but it is, to say the least, doubtful whether any such distinction need be made. If the White Pine were planted in Michigan universally and everywhere, where the land could be spared, it would find congenial soil enough even in those counties that have been most heavily covered with it.

Without discussing the value of other well-known species a few may be mentioned as specially worthy of planting in Michigan. The European Larch, famous for the durability of its timber, and perfectly adapted to our northern climate; the *Ailanthus*, the only tree that has successfully controlled the drifting sand plains of southern Russia, and will perhaps be more valuable than any other on our own sand dunes; the *Catalpa speciosa*, of which specimens a foot and a half in diameter may be seen in Ann Arbor, and which, probably, may be depended upon for hardiness throughout the southern portion of the lower peninsula; the white ash and a long list of indigenous trees, any of which may be planted with every reason to expect a good return. The consideration of the large number of species, both indigenous and introduced, that may be successfully cultivated in Michigan is of great importance, but requires too much space for this article, and will have to be taken up in a separate paper, together with the consideration of the species best adapted to our sand-dunes, and the methods to be employed in planting them.

4. Admitting that it is desirable that the planting of trees in Michigan should be undertaken at once and in earnest, what are the means of securing this and of ensuring the best results?

(1) The Legislature of the State may promote the work by offering encouragement to tree planting in the way of exemption of property from taxation. As to the form of legislation and its practical details, a careful study of the action of other States will furnish valuable suggestions. Of all State laws on the subject of tree planting that have come to my notice, that of Iowa has seemed preëminently adapted to the purpose. The law provides that "for every acre of forest trees planted and cultivated for timber within the State, the trees thereon not being more than twelve feet apart, and kept in a healthy condition, the sum of one hundred dollars shall be exempted from taxation * * * for ten years after each acre is so planted; provided, etc." Possibly other forms of legislative action on this subject may be found better, but that of Iowa has this very excellent feature, that it has very largely accomplished the object aimed at. We can profitably follow the example of Iowa, too, in securing the preparation and distribution of something corresponding to their "Forestry Manual," an unpretentious pamphlet of about thirty pages, filled with valuable information and practical hints on the subject of tree planting, and distributed gratutitously among the farmers of the State.

(2) The State ought also to be establishing facts upon which to base the future management of the great work of reforesting its waste lands. Two or three experimental stations, located in as many parts of the State, where trees of all sorts, both native and foreign, can be cultivated and the results recorded, would enable us in a few years to demonstrate the usefulness of some kinds and the unfitness of others for general cultivation. Meteorological observations carried on at these stations would give data for the solution of the difficult but important question relating to the climatic effects of forests.

(3) Very much depends upon the railroad companies, owning as they do, in the State of Michigan, lines aggregating over four thousand miles in length, with large grants of valuable land, they control, in a very great measure, the agricultural and commercial interests of large areas of the State. The Detroit, Mackinac and Marquette Railroad alone owns over 1,300,000 acres of land, and the Flint and Pere Marquette, the Grand Rapids and Indiana, and other lines are possessed of large tracts of both farming and timber lands. An abundant supply of wood for ties and manufacturing purposes is a prime necessity of all these lines, and may be secured by the prompt adoption of a

liberal and enlightened policy in maintaining or restoring a suitable amount of forests on their lands. A number of western railroads, though obliged to contend with great natural disadvantages, have taken hold of this work with great enthusiasm, and several of them are now employing paid foresters to direct the work of raising and caring for forests along their lines.

(4) The farmers of the State have very much to do with the future of our forests, and, unfortunately, they have not yet, as a rule, taken a practical interest in maintaining or restoring them. There is, however, no class more ready to enter into undertakings that promise to be productive of good, and none more accustomed to meet and overcome difficulties. When the farmers of Michigan are once possessed with the conviction, that trees are often far more valuable than any other crop, and that they render the farm more productive and worth more per acre, trees will be planted.

(5) A few at least of the educational institutions of the State can do an important work by giving forestry an honourable place among the subjects of their respective courses of study. Whether there is as yet a science of forestry in the United States or not, there will be before long, and intelligent and interested action on the part of such institutions will aid greatly in establishing the science, and in gaining for it the confidence and encouragement of both government and people. A beginning of this kind has been made at the University of Michigan, in connection with the School of Political Science recently established there, and the lectures on forestry are attended by a class of about fifty.

(6) The General Government still owns something over a million acres of land in Michigan, and the State Government has yet large tracts of land under its control. If, instead of throwing this away, or selling it at the rate of $18 per 160 acres, any considerable portion might by any means still be kept in permanent forests under Government control, and this control be exercised wisely and for the public good, as is done in the State forests of the old world, forestry in Michigan would become an established fact. In some or all of these ways it is to be hoped that the great work of restoring the forests of the State may be accomplished.

POPLAR TREES FOR THE MANUFACTURE OF PAPER AND CHARCOAL.

By Wm. Saunders, London, Ontario.

Within the past few years the consumption of the wood of several species of poplar for paper making has greatly enhanced the value of these trees, and so extensive has been the demand that in many sections it has been difficult to supply it from the immediate neighbourhood, and this wood, hitherto of little value, now commands a price nearly or quite equal to the more valuable sorts. The species which have, up to the present time, furnished the bulk of the wood used in paper-making, are the aspen or Trembling-leaved Poplar *(Populus tremuloides)*, and the Silver-leaved or Abele of Europe *(Populus alba)*. These have also been used to some extent by charcoal-makers, and are found to produce a superior quality of charcoal. Doubtless the Large-toothed Poplar *(Populus grandidentata)*, and the cotton-wood of the North-West *(Populus monilifera)*, and probably the Balsam Poplar *(Populus balsamifera)*, being similar in their structure and characteristics, will prove almost, if not quite, equal in value to the two species first named.

These trees are of very rapid growth, most of them thrive on inferior soils, and are capable of cultivation in almost all the settled portions of the Dominion. The aspen is said to be the most widely diffused tree of North America, and one of the most abundant in the Far West, where it ranges from the Arctic regions to California. It extends over the southern half of the Labrador peninsula, and is common throughout the whole region from the Gulf of the St. Lawrence near the mouth of the McKenzie River, about latitude 67. Throughout the North-Western Territories it is the commonest tree in the partly-wooded and prairie districts, and is the chief fuel used at the Hudson Bay Company's posts and by the Indians. The quantities of this wood existing in the forests throughout this vast area are immense.

The balsam poplar is distributed over an area almost as great as that of the aspen extending to about the same point north, and about Lakes Huron and Superior and in the valley of the McKenzie River attains a large size.

The large-toothed poplar does not range nearly so far north, but is abundant in New Brunswick and Gaspé, and is found in most parts of Ontario and Quebec.

The cottonwood is very common throughout a large portion of the North-West Territories, where it is the chief source of fuel for the settlers.

The silver-leaved poplar was introduced as an ornamental tree from Europe, and the rapidity of its growth and beauty of its foliage induced many to plant it. It will thrive well in waste places and in the poorest soil. While young it forms a rather pretty tree, but becomes ungainly as it grows older, and its persistent habit of sending up suckers from the roots has almost led to its abandonment for ornamental purposes. Wherever this tree has been planted throughout the northern United States and Canada, it has, as far as is known, proved hardy, and in rapidity of growth it has few equals, the trunk often attaining a diameter of two feet within fifteen years. Isolated trees usually have low and wide-spreading heads, but closely planted in groves they run up tall and straight, and the poles taken out in thinning can be turned to many useful purposes, and the trees when grown converted into useful lumber for building purposes where other timber is scarce.

Poplar trees may be grown from cuttings, suckers or from the seed contained in the catkins. Cuttings may be made from two or three to five or six feet in length, and from an inch to two or three inches in diameter. They should be taken from the young woods and the larger end sharpened by a sloping cut on one side to expose the bark. Suckers can usually be obtained with a small proportion of root and grow very readily ; cuttings, suckers, and young trees should be planted four feet apart. If young trees are to be raised from seed the catkins should be gathered in June, the seed rubbed out with the hand and mixed with sand to facilitate even sowing, planted in drills on mellow, moist soil from half an inch to an inch deep, and kept free from weeds during the summer ; the young trees will be ready for planting the following season.

On most farms there are waste places, broken land, or small areas of poor soil unsuited for general agricultural purposes, probably nothing could be used to occupy so profitably such waste places as poplar trees. In addition to the value of the thinnings while growing and such portions of the wood as the owner may choose to sell when grown, he might enjoy all the advantages resulting from adjacent forest growth. Such clumps or belts would act as useful wind breaks, protecting the crops in adjoining fields; they would help to equalize violent alternations of heat and cold, exercising a conservative influence on the humidity of the atmosphere, aid in inducing rain fall and in purifying the soil and the air.

FOREST TREE CULTURE.

By Hon. H. G. Joly, Quebec.

The European traveller who visits only the settled parts of this Province, is invariably disappointed at the scarcity and meanness of our trees. Of course, if he leave the beaten tracks of travellers, and goes far enough into the wilderness, up the Ottawa and the St. Maurice, he will see fine timber, but, in our settlements, we can only show him, here and there, at long intervals, one solitary elm, model of grace and beauty, and the traveller will feel, as we do, grateful to the man who spared that tree.

On a warm summer's day, the Desert of Sahara, with its lovely oasis, would be suggestive of coolness, compared with our country. No trees to shade the dusty roads, to shelter the panting cattle, to set off the neat white-washed houses ; only far away, hidden nearly out of sight, the patch of small neglected timber which the farmer is compelled by our stern winters, to spare from the general slaughter, as, without fuel, he will die.

If every acre of ground were covered with valuable crops, one would try and get reconciled to the absence of trees, and bow to the iron rule of our age which converts everything into cash. But what a small proportion of all that ground is used profitably !

We can find plenty of spare room for growing forest trees; they are not only the most beautiful ornaments to a country and the most useful product of nature, giving fuel, timber, shade, shelter, retaining moisture and a protection against droughts, etc., etc., but, considering the question from a *strictly money-making* point of view, the culture of forest trees is perhaps the *best and safest investment* that can be made.

It is rather difficult, I admit, to induce people to plant forest trees in this Province, where, for generations, they have been brought up to look upon the forest tree as their natural enemy, to be got rid of at any cost, hacked down, burnt out of the way (for want of a better mode of disposing of it), and still troubling the settler for years with its everlasting stump, an obstacle to thorough cultivation. The children and grandchildren of the old settlers remember too well; they cannot be expected to love the forest tree, but self-interest ought to conquer instinct and prejudice. With us, land is not too valuable for forest tree culture. In Europe, where land is scarcer and more valuable than here, they plant, every year, thousands and thousands of acres in forest trees.

To those who say that our country is *too new* to think of that, I will answer that New Zealand, the Australian Colonies, India (so far as the settlement of the land by Europeans is concerned), are newer countries than ours, and they are all taking active steps towards the planting of forest trees on a large scale. In the United States, the Federal as well as the State Governments encourage the culture of forest trees by grants of land, and money, and exemption from taxation, and powerful societies are co-operating with energy and liberality. The Government of Canada has begun by offering free grants to those who undertake the planting of a certain number of trees on the western prairies; but I will here observe that it will require more active measures to set the people in motion, and especially the establishment of nurseries, where the people can buy young trees and seed, and the beginning of some large plantations, as an example, to show to the people, by practical results, that the culture of forest trees is within the reach of every one.

We see in the papers that the western railways have started the culture of trees on their own account; the St. Paul, Minneapolis and Manitoba Railway is reported as having appointed a superintendent of tree culture, who has just contracted for three hundred thousand trees, and most of the roads west of the Mississippi and Missouri rivers have also begun to raise trees, in order to insure a supply of ties, and for other purposes.

How many give as their reason for not planting forest trees, that they will not live long enough to get any profit out of them. You do not hear that in Europe. Are people more selfish in America than they are in Europe? Or is the feeling of self-reliance so much more developed in America that the people here expect the next generation to take care of itself as they have taken care of themselves? Then leave them some timber, if you wish them to have the same chance that you had. It was but a heathen who wrote, more than eighteen hundred years ago: "*Arbores serit diligens agricola quorum fructus numquam videbit.*" "The good husbandman plants trees whose fruits he will never see." But I must not drift away from my subject into philosophical considerations; it will be more to the point to show that the profits of forest tree culture are not only enormous, but that their realization is far from being delayed to an indefinite future.

I do not pretend that the whole of our farms should be planted in forest trees; that would be too absurd. Our farms are generally too large for the small number of hands we employ; there are always some odd corners, idle strips, stony or damp patches which it does not pay to cultivate; begin and plant forest trees there, suiting the tree to the nature of the soil—you will find some for every kind of soil. Once planted and fairly started, they will take care of themselves, give no trouble and increase yearly in value, in a wonderful ratio, so well expressed by the Honourable F. B. Hough, chief of the Forestry Division of the United States Agricultural Department, in the address lately delivered by him at Columbus, Ohio.

For years past, I have sought the best and cheapest mode of re-wooding our denuded lands, and have made some experiments; they have not yet been carried over a great many years and are, so far, most encouraging, notwithstanding my numerous mistakes and enforced absence at the best seasons, and they satisfy me as to the correctness of the statements made by the leading advocates of forest tree culture. I trust not to be

charged with egotism if I now give the results of some of those personal experiments, rather than copy or condense what has been written by others, and it will be a great satisfaction if I can induce a few to try for themselves.

In selecting forest trees for planting, the first consideration ought to be the nature of the soil where they are to be planted; if the soil is not favourable to one kind of tree, do not waste your time in planting it there; you will find another tree that will suit the soil. After paying all due deference to soil and climate, you must be guided in your selection of a particular kind of tree: 1st. By the value of the timber. 2nd. The greater or lesser ease and certainty with which the tree can be grown. 3rd. The rate of growth.

I have tried principally black walnut, oak, elm, maple, ash, tamarack, Russian pine, and fir and poplar, and will now give some of the results.

Black Walnut—The value of that wood is so considerable (a dollar a cubic foot at the present time), and it is getting so scarce that it struck me as the most worthy of being introduced and cultivated here. True it did not grow spontaneously any where in the Province of Quebec, but this appeared to me no conclusive reason why it should not grow and flourish here. The lilac comes all the way from Persia, and it spreads out its leaves earlier and keeps them unchanged later than our typical tree, the maple. I did not fear our great colds, for in the West, the natural home of the black walnut, the thermometer often ranges as low as here, though for a shorter period at a time. It was well worth trying.

I procured a bag of black walnut nuts from the West in the fall of 1874, and sowed them at once; it was late in November; we had to remove the snow and break the frozen ground, but I thought the earth the safest place to winter them. They began to come up about the tenth of June following; not five per cent. failed, and they have never been artificially sheltered in any way. It would not be worth while introducing them here if they could not take care of themselves.

Of those left undisturbed where they were sown, I have not lost one; they have now had six summers' growth. I have just had some of them measured, so as to be certain of their size; the height of the four largest is as follows: fifteen feet and a half, fourteen feet and a half, fourteen feet and twelve feet, and thick in proportion. Those have not been transplanted; now notice the difference between them and those that have been moved.

In the fall of 1875, when they were only one year old, one lot were transplanted, but the soil was not favourable and they have not done well, so far; however, they are beginning to recover. In the spring of 1876 I transplanted another lot; the best are about eight feet high; and another lot last spring, the tallest of which are about ten or eleven feet. All those trees are the same age as the fifteen and fourteen feet trees; the difference in size results from the transplanting, wherefore it is much better to sow them at once where they are to remain. Plant them thick, as the wood of the young tree is rather soft, like that of our native butternut.

It is contrary to all preconceived ideas, even among those who handle timber every day, but nevertheless true, that the black walnut *(Juglans nigra)* and the Canadian oak *(Quercus alba)* as a rule increase much more rapidly in girth than our pine and white spruce. I conclude, from counting the rings on the trees after they are cut down, and from watching the growth of the living trees, that black walnut and Canadian oak generally gain one inch in diameter in about three years and a half, while our spruce and pine take about double that time to accomplish the same result; this can easily be ascertained by counting and measuring the rings. Of course there will be exceptions, and it would not be fair to judge by those only; I speak of the average.

It is now time to say something of the profits, and I must be careful to avoid exaggeration. Judging by the growth of the living trees and the rings of the timber, when cut, I do not hesitate to say that a black walnut, under ordinary circumstances, at the age of seventy-five years, will have attained twenty-one inches in diameter and will contain at least fifty cubic feet of timber, the actual value of which is about one dollar per cubic foot. (See for prices the *Lumberman's Gazette*, published at Bay City, Michigan, the numbers of the 26th January, 2nd February, and 2nd March of this year.)

For how many such trees, judiciously planted, will there be comfortable room on one

superficial acre? It is difficult to find a regular plantation of any kind of trees of that diameter here, to help us toward a solution of the question, and the way in which trees are scattered in the forest and their irregular size leave but a vague impression on the mind, varying according to the personal experience of each. I am not ready to answer the question at present for want of full information, and will not venture a guess, but I do not feel the same hesitation where trees standing in one single row, with plenty of room on both sides, are concerned; in that case, trees twenty-one inches diameter would not be too close, standing at eighteen feet from one another. Take a farm three acres wide, with a road across the width and row of black walnuts of an average diameter of twenty-one inches on each side of the road, the trees eighteen feet distant from one another, you get sixty trees containing fifty cubic feet each, three thousand cubic feet, worth, at the present price, three thousand dollars.

But it will be safer to sow the black walnut in clumps, pretty close. They will protect one another when young, and, as they grow, they can be thinned gradually. Their culture will entail little trouble, apart from the preparation of the soil, and the sowing of the nut; the work of thinning will soon repay itself with the timber removed. The better the soil, the quicker the growth. Such a valuable tree as the black walnut deserves to be well treated. If possible, find some shelter against the strongest prevailing winds for the young plantation, a belt of older trees, or a hill. They are rather soft, like our butternut; it is the only drawback I have found out so far, but not fatal. Even the youngest trees will get several branches torn off and very ugly wounds without dying; they are wonderfully hardy.

The value of these plantations will increase steadily from the day when they have taken root; they represent an ever-increasing marketable value long before the expiration of that period of seventy-five years which I have indicated—not as the limit of their growth; they will grow for centuries, but—as the period necessary to attain a profitable size, when they can be cut down without waste.

The Butternut grows spontaneously here; its beautiful timber can be worked with as much ease as the softest pine; it ranks immediately after the black walnut, and is inferior to it only in the colour of the wood, which is lighter. Rubbed with linseed oil, it takes the soft, rich hue of sandal wood, and if judiciously sawn, shows wonderful marks. I recommend strongly its culture, and will be glad to send nuts to those who will plant them, next fall, as we gather a large crop of them.

White Oak—The acorn ought to be sown as soon as possible after it drops, in the fall, as it loses its vitality rapidly, and to avoid the great check resulting from transplanting, it ought to be sown at once, if possible, where the tree is destined to remain. Its wood is tougher, and not so liable to break when young. I think it ought to grow with at least as much ease and rapidity as the black walnut; ours are rather behind, as they have been transplanted twice. The oak is so useful and valuable, and its culture so easy, that every plantation of trees ought to contain a good proportion of oak, provided the soil be not too poor for it.

White Elm—This splendid tree recommends itself sufficiently by its beauty and usefulness to dispense me from dwelling at any length upon it; it grows rapidly in a deep, damp soil. I have not grown it from seed, but by taking up young trees from a low island, where they grow in abundance. It appears to bear transplanting better than the oak, walnut or maple, and can be moved safely of a much larger size than any of those trees.

Maple—If you wish to raise a maple sugary with the smallest amount of expense and trouble, go to an old maple grove in the fall; the ground is covered with a thick carpet of seedlings. After rain, you can pull them up by hand with the greatest ease, without breaking any of their small roots, if you are moderately careful. Plant them at once in a corner of your garden, about two feet apart each way; weed during the first two summers with a light hoe. We found, after four years, the trees fit for transplanting, about five feet high, and the thickness of a man's thumb. As the ground was mellow and free, we took them up with little damage. Of course, there is still the objection of transplanting, but in a less degree than when you seek your maples in the woods, where their roots are mixed up with those of other trees, stumps and stones, and must be more

or less torn up with violence. There is an immense difference in the comparative cost of the two processes, which will tell upon the hundreds of trees required to make a sugary worth working. Those small trees never fail (at all events, none of those we transplanted did), while much larger trees, more injured in the moving from the forest, die in great numbers, and the survivors are seriously checked. I have been told that the seedlings would overtake them, but have not yet had time to verify that statement. Maples will begin to yield a reasonable quantity of sap for sugar, when about twenty or twenty-five years old.

The Ash—It is well known, and its different varieties are found very useful, especially the white ash, which recommends itself for its elasticity; its wood is beautifully marked, and is largely employed in the making of furniture, panels, etc. It will thrive where the walnut, oak, and maple refuse to grow, or only linger miserably. I remember part of a maple avenue, where, year after year, the maples had been replaced over and over and failed; at last, we had recourse to white and black ash; none failed, and they are progressing most satisfactorily.

Tamarack will grow in damp, wet ground; we have succeeded with them where even willows had failed; the value of this timber and knees is too well known to require any comment from me.

Russian Pine (*Pinus Sylvestris*)—In making new plantations, especially from seed, it is no more trouble to try foreign than Canadian seed, and, however strange it may appear, I find it easier to procure the seed of the Russian and the Himalaya than of the Canadian pine. One may find among foreign trees valuable additions to our plantations; such as, I think, the Russian pine, native of the north of Russia. Our climate suits it admirably, and it appears a more vigorous grower than our Canadian white pine. I cannot give any opinion as to the quality of the timber, as they have only been sown in the spring of 1873. They started rather slowly, and their height and thickness are less than those of the black walnuts sown two summers later, in November, 1874; but they are now beginning to take more rapid strides. I measured the season's growth of one of them last year, on the third day of July. It showed twenty-six inches in length, gained in about thirty days, as the buds of the coniferæ do not open much before the beginning of June; the year's growth was already over, and from that moment it only thickened and hardened into wood.

Since the growing season of our trees is so short, we ought to lose no time if we wish to help them along, by thinning, removing useless branches, mellowing the ground, or otherwise; all that ought to be done before June, so as to afford them every chance during the growing month. I think the *Abies Nobilis* or White Fir of Washington Territory is the fastest grower among the Coniferæ.

Poplar—I must beg the indulgent reader to listen to my plea in favour of this tree and not condemn it unheard. I speak of the kind known as Cotton Wood or *Populus Canadensis* (not to be confounded with the Balsam Poplar and Aspen). Its growth is wonderfully rapid; twenty-three years ago, in November, 1858, I stuck in the ground three cuttings; it was my first trial at tree culture. They are now over sixty feet high, one is twenty-five inches in diameter, the second twenty-four inches, and the third twenty-two inches, an average of one inch a year in diameter. In every new plantation, in a country completely denuded of forest trees, and especially in re-wooding our western prairies, I would recommend at the start, a plentiful use of this poplar, without neglecting, of course, more valuable trees. It strikes at once from cuttings, which can be procured and transported anywhere with the greatest ease. Thanks to its rapid growth, it will soon enliven the scenery (as it is a handsome tree), afford shade, shelter the other trees in the plantation and supply timber, not of the first quality, but better than none, until the slower growing trees are ready with their more valuable contributions, and it can easily be cut down when the room it occupies is wanted for better trees. This poplar has been introduced from Canada into France, where it is designated as the "Peuplier du Canada," and considered as a useful and profitable tree.

I must now close this long article. The results of my experiments are nothing to boast of; practical men would have done much better. If I had chosen the soil for the different kinds of trees more judiciously, had not left them much too long without thinning

them, and been able to attend to them in the proper seasons, I am convinced that, as a whole, they would be much finer. At all events, it shows that any one who will take the trouble, can begin the culture of forest trees without previous training. I do not speak of orchards here. Having no School of Forestry in Canada, we must educate ourselves; we have got books written on the subject by eminent and practical men, and we have got, always open before our eyes, the great book of Nature.

TREE PLANTING ON THE PRAIRIES.

By S. M. Emory, Minnesota.

The development of the vast system of railroads throughout the west, is bringing into prominence a scope of country to which the name "empire" is peculiarly applicable.

Our eastern friends, whose journeys have been confined to the country east of the Mississippi, have but a limited idea of the boundlessness of this immmense section.

To the new comer, it is hard to make selection from so much that is deserving and desirous; and the usual distinction made, is a settlement of the question—stock raising or wheat growing. Wheat growers are usually attracted to the Red River Valley, the popular name given to the territory extending from Lake Traverse, on the boundary between Minnesota and Dakota, as a starting point on the south, extending north to Lake Winnipeg, with eastern and western boundaries extending indefinitely into Minnesota and Dakota on either side, embracing, also, nearly all of Manitoba.

Stock growers, on the contrary, find greater attractions, in milder winters and better grazing facilities, in the belt of country lying south of the Red River Valley. Each section presents remarkable inducements in its particular line, and both are equally destitute and equally desirous of the benefits arising from tree planting.

The most skeptical caviller from the east, after having given just and impartial criticism to either of these regions, can only find two tangible points of objection to the country: First, the quality of the water; second, the absence of timber. The first is easily remedied by the use of cisterns, supplemented with ice; the second, by the judicious planting and cultivation of desirable varieties of timber. If this prove successful, it must be done under direction and auspices of horticultural bodies and sound doctrine, and information must be disseminated.

The nurseryman can give the embryo tree the best of care, and can send it forth, a thing of beauty, with his tenderest blessing, but it will certainly come to naught, unless the same intelligent providence and forethought attend it on its perilous struggle for existence, surrounded on all sides by the lower and inferior types of creation.

It is dense and overshadowing ignorance, that so effectually bars progress in horticultural effort; the need and want of timber, fruit and ornamental trees, is obvious.

All are anxious to enjoy, but the usual failure that waits upon their careless ministrations has a decided tendency to deter and discourage any further expenditure of time and money, both on the part of producer and consumer, with this difference however: the producer or nurseryman, usually having his all invested in his business, will not allow total failure to ensue, by the neglect on his part of getting rid of his stock, and thus he shifts the responsibility on the shoulders of the planter where it belongs.

The passage of the United States timber law gave tree planting its real impulse. The action of the Government in this respect is munificent, offering as it does, free of cost, 160 acres of land to the planter, save the small sum incident to the cost of filing papers, and the attendant expenses to the planting and cultivation of ten acres of timber. This inures to the benefit of the planter, and is worth all and more than the actual cost of complying with the requirements of the law. Those claims are eagerly sought, being particularly desirable for non-residents, in the liberality of the law as regards settlement and residence.

Many file, depending on future developments to help them toward a compliance with the law, and it is from these, ignorant of the simplest laws of nature, that the greatest annoyances arise.

Their lands, as a rule, are poorly prepared, and sad lack of judgment is shown in the selection of stock, in planting it, and subsequent cultivation. In many instances absolute lack of cultivation follows, so much so, that in traversing the frontier, when attention is directed to some particularly weedy and neglected plot of ground, the information is vouchsafed that this is Mr. So and So's timber claim.

Men, otherwise intelligent, have been heard to say that the timber law was absolutely inoperative, owing to its being an impossibility to successfully grow timber upon the naked prairie ; a new version of the old story of the fond mamma, who didn't want her boy to go near the water until he could swim ; all this in spite of the fact that in the settled parts of this country, timber is steadily on the increase, in spite of the amount used annually for fuel and other purposes. And it is no infrequent occurrence to exhume from excavation on the prairie, well preserved specimens of timber, giving the best evidence that it formerly existed on all our prairies.

One of the most plausible reasons for the abundance of alkaline deposits, as evinced in the water and other ways, is a heavy deposit of ashes in the soil (?) centuries ago, caused by the destruction of timber by fires. The increase of timber is owing to the suppression of these fires, which in their annual sweep over the country, destroy the season's growth of such deciduous trees as may have sprung up from wind-sown seed.

Two years ago, in making a delivery near Fort Abercrombie, a Norwegian, in company with his wife, called for his bill, in which was a large quantity of cottonwood seedlings. The woman objected strenuously to the goods, giving as her reason, that she did not think they were cottonwoods, as the same things were growing all over their new breaking. Subsequent examination proved this to be a fact ; it was "bringing coals to Newcastle."

As a rule these claims are being planted to the quick-growing deciduous trees, as Cottonwoods, Box Elder, Willow, and Soft Maple—all good in their place, but hardly to be chosen as life-time neighbours. These planters are many of them poor, with urgent calls for all the money they can get, and it is not strange that they secure those trees that can be had to the best advantage, financially and otherwise. The islands and low lands of the Missouri furnish the bulk of these trees ; and cottonwood seedlings are sold at figures that will hardly pay for count and packing ; these, if given anything like a fair chance for their lives, will get out at the little end of the horn, and struggle into some prominence as applicants for public favour ; however, at best they are poor in quality for fuel and timber, and their open growing tops offer but little protection from drifting snow.

The White Ash, willow, and Box Elder are of more value to the frontier than the cottonwood. The Lombardy poplar is useless, not being sufficiently hardy to stand the low temperature of the winters. The Soft Maple suffers as a small tree, from the same cause, and after attaining respectable dimensions as a tree, suffers from wind storms, which break the tops badly. The Walnut, Butternut, European Larch, Hard Maple, and White Elm are all within reach, and highly desirable as timber trees.

Many are planting liberally of evergreens. These, with proper care, are flourishing, and are valued as snow and wind-breaks, and also as ornamental trees ; their rich deep living green breaking the monotony and desolation of the snow-covered prairies.

The varieties doing the best are in the following order, Scotch Pine, White or Silver Spruce, Norway Spruce, American Pine, Balsam Fir, White and Red Cedar, and Austrian Pine. Their growth in our rich soil, stimulated by good cultivation, is phenomenal.

Before leaving the subject of timber planting, attention should be called to the merits of the Black Oak. This possesses peculiar attractions to those living on the prairie. It is easy to propagate by sowing the acorns, care be taken not to disturb the tender rootlets, during the first season, until they have penetrated into the earth and are well established. They increase in size wonderfully fast, and from their habit of holding their leaves during the winter, are almost equal to evergreens as a shelter-belt a quality by no means to be despised in the blizzard region.

The immense consumption of timber for railway purposes, and the protection of the track from snow drifts, makes it highly important that all railway companies should take an active interest in the planting, and where practicable plant trees themselves sufficient for their own needs. The following papers in reference to this important subject are worthy of attention.

TREE PLANTING BY RAILROAD COMPANIES.

By Franklin B. Hough, Chief of the Forestry Department of the United States.

The freight and passenger traffic of the country having passed in a large degree into the hands of railroad companies with a constant tendency to further increase through all coming time, so far as we can now foresee, it becomes a question worthy of notice, as to how the maintenance of these railroads is likely to affect our future timber-supply, and how far it may be for the interest of the companies owning these roads, to provide for their own wants, by reasonable and sufficient planting. We may also in this connection consider the incidental benefits that may be gained from planting, besides those derived from timber as a material for construction or other use.

We have in the United States, about one hundred thousand miles of railroads. The past affords a record of steady increase, but how long it may continue, or to what limit it may reach, it is wholly beyond our power to foretell. In a hilly country these lines of travel must necessarily follow the valleys, and a road once made will generally satisfy the demand, unless, as in the Mohawk valley, there be an enormous amount of through traffic from great distances beyond. There must, however, come a time, when the country will be supplied, even in level regions where there are no difficulties from grades to overcome. We will, however, take the facts as they are, and without estimating future increase, examine the question of maintenance in the single item of railroad ties, and see what facts show.

The number of ties to a mile ranges from 2,200 to 3,000, and in some cases as high as 3,500. If we assume that they average 2,500 to the mile we have a quarter of a billion in use. They average eight feet in length, and about seven inches deep and eight wide, giving the contents about three cubic feet apiece, or in all six millions of cords. If piled cord fashion, they would form a pile four feet high, eight feet wide, and 4,575 miles long. Placed end to end they would span the earth fifteen times at the equator, or in one line would reach miles beyond the moon.

These wooden ties besides being placed on the ground, partly buried in sand or gravel, and alternately wet and dry, are exposed to great strain and pressure from passing trains, and under these combined influences are always tending to decay, so that in a period ranging from three to twelve years, they must be replaced by new ones. Their durability depends most upon the timber, and much upon the soil and the amount of use. We may take their average life at from five to eight years, and we shall need from 30,000,000 to 50,000,000 new ties a year for maintaining the present railroads of the country in constant use.

The number of ties that can be cut from an acre of wood-land varies exceedingly, but, at 500 to the acre, we shall need to cut over from 60,000 to 100,000 acres every year to meet this demand.

We can scarcely expect trees to grow to the sizes necessary for ties in less than forty years. In some places it would be no more than twenty, and often forty; but taking thirty years as the average we shall need from nearly two millions to over three millions of acres, or from 3,126 to 4,687 square miles of forest to keep up this supply. In Europe, the beech, which we know is very perishable when on the ground, is made to last from nine to twelve years by various methods of preparation either by the injection of sulphate of copper, at the cost of about twenty cents a piece, or by thoroughly creosoting at eighteen cents, or by immersion in a hot solution of sulphate of copper at about eleven cents, or by external carbonization at six cents a piece. The oak, in Europe, is expected to last in use, as railway ties, from twelve to fourteen years. The sap-wood only of the

oak admits of the injection of antiseptic substances to advantage. The pine, when injected, last from ten to eleven years as ties.

Hitherto these methods of preservation have not been much employed in our country, the prices of timber being still so low that it is cheaper to renew them when they decay than to prolong their use by their preparation as in Europe.

A time must surely come when this subject will receive attention, but for the present let us consider the amount of planting required for the maintenance of a supply of ties, and how this can be done with greatest economy by the companies owning these roads.

At the rates we have assumed, there should be from eighteen to thirty acres of woodland for every mile of single track road. Taking twenty-five as a safe average, it follows that there should be somewhere 2,500 acres of forest for the maintenance of every hundred miles of track. This is equivalent to a belt of woodland twelve and a half rods wide along the road, or about three times the width of the right of way.

But woodlands need protection from cattle and from fires. The former can only be got by fencing, and the latter only by vigilance. It would, unquestionably, be cheaper to have these woodlands in a body, or in parcels at convenient distances from the line. It is further to be remembered that railways must run along the valleys where the land is generally rich and high-priced as compared with that in hilly regions, where the timber would grow just as well. In the end, there might not be much difference whether this woodland was owned and cared for by the companies, or whether they bought the ties from those who grew them. There are always other products from a cutting—such as firewood, and in the oak and hemlock, bark for tanning—that may be saved, and always some timber that is worth more for other uses than for ties. We assume that land for this use can be bought for twenty dollars an acre, and at this rate it will need the investment of $500 in land, for every mile of track to maintain a perpetual supply of ties for its use. This is the fixed capital in land, without including the cost of planting and management, nor of cutting or delivery. It will undoubtedly be a wise and proper investment of money on the part of railroad companies, by thus rendering themselves independent for the supply of a material as necessary for their use as iron itself. There will arise, and perhaps may now be found, a class of men who would undertake by contract the planting and care of such woodlands, and this would doubtless prove the most economical mode of management.

With reference to the use of wood by railroads for fuel and for bridges, we are fortunate in finding them both largely decreasing, the former being superceded by mineral coal, and the latter by permanent structures of stone and iron. The tendency will doubtless be much farther in this direction, and with every motive in its favour. In Europe we seldom see a station, or other railroad building, excepting those of brick or stone, and there are no platforms for handling freight, but those of masonry and earth. A shingle-roof is almost wholly unknown and the flooring is very often of brick or stone.

The substitution of other materials for ties is a very different matter. In the early history of railroads in our country blocks of stone were tried, and proved a failure. In India, where the white ants prove destructive to wood, a bedding has been secured by the use of bowl-shaped castings of iron, with the convex side up; and upon some lines in Europe iron ties have been used. Other mineral substances have been proposed, but all of them are much more costly than wooden ties are, and will be for some time to come.

There are other important motives for planting by railroads that we next notice. The consolidation of embankments, and the fastening of the soil upon the slopes that overhang the track, can be done in no way so effectually as by the roots of trees and bushes, and for this use those that have tracing roots, and that are continually sending up sprouts at a distance from the parent tree acquire great value, while they could scarcely be tolerated near cultivated grounds. The erosion of banks by streams can best be corrected by the planting of alders and willows, and the ravines that are so sure to form in light soils, upon steep banks, from rains, are effectually prevented, even by a dense growth of bushes, but better by forest trees.

As to the kinds to be used, and the mode of planting or starting them, everything depends upon the soil, climate, and other circumstances. As a general rule, the Coniferæ, from their liability to suffer from fires, are not desirable near a railroad track, and in some places in Europe, the birch and other deciduous trees are planted along the sides of lines that run through a pine or spruce forest.

There are other cases in which judicious planting may prove of inestimable advantage, as well to railroads as to common highways, in preventing drifting snows. In our northern States and in Canada this becomes in winter a matter of great anxiety to the traveller, and often of vast expense to railroad companies. It may in every instance be alleviated or wholly prevented by judicious planting, especially on the side of the prevailing winds. A single row of deciduous trees will scarcely produce an effect; there should be at least half a dozen rows, and in the more exposed places twice this number, set as closely as may be conveniently grown, to secure full immunity from this cause. A double row of evergreens will generally serve the purpose, but it would still be well in a bleak exposure to have a narrow belt of woodland on the outside to break the force of the storm, and protect the plantation from injury.

So important has this subject proved to be, that the Northern Pacific Railroad in Minnesota and Dakota has undertaken to protect its line at all the cuttings and exposed places for the whole of the distance or as far as it is possible to make trees survive, and with the view of continuing these plantations at places where it is less necessary for the general benefits to be derived from their presence.

Several other railroad companies in the northern and western States have given attention to planting, in some cases for shelter against drifting snows, and in others for the encouragement of settlement, by proving the capacity of the country for the growth of forest trees, in treeless regions on the prairies and the plains.

This subject has in recent years been receiving attention in Russia and other countries, with the most encouraging results.

In these plantations along railroads in a prairie region, it is necessary to prepare the soil for planting, by previously breaking, and afterwards thoroughly and deeply ploughing, and to afterwards cultivate the trees until they have grown sufficiently to shade the ground. It is also necessary to guard against accident from fires whether those that are set by locomotives, or those that sweep over the prairies in the dry seasons, destroying every living thing in their way. The best modes of prevention against these fires, is by carefully burning off the dead herbage and dry materials, selecting for this a time when the fires can be controlled and limiting their spread by a few furrows of freshly ploughed soil. As a country becomes well settled these running fires become infrequent and almost unknown, and the care required in protection grows every year less.

Although there may be infinite advantages derived from ornamental plantations around railway stations, the idea of affording shade to the traveller by avenues along the line presents more points than one for consideration. Along the common highway they become a positive luxury in a hot summer day, as the carriage passes leisurely along under their shade. Is it the same with the flitting shadows on a railway train? Does not the effect become painful to the eyes, and is not the beauty of the scenery lost when the shade is too near, and when there is too much of it? Whoever has travelled in Northern Itlay must have realized this discomfort from the abundance of trees planted, perhaps, partly for ornament, but oftener for use along the sides of the railways. They are far enough apart to afford glimpses of distant scenery—perhaps of marvellous beauty—but in an instant obscured to be the next moment revealed, and so continually till the eyes grow weary and close upon the scenery they cannot enjoy.

TREE PLANTING FOR RAILROADS.

By Dr. John A. Warder, North Bend, Ohio.

Not long ago some suggestions were advanced by the *New York Post*, or the *Nation* newspaper, intended to show how great operations in Forestry might be carried forward by the combination of capital united in joint stock companies. The contributions of many persons, even of limited means, could thus be brought to bear upon the subject effectively, and the company could be enabled to carry forward operations of a magnitude that would be altogether beyond the ability of most individuals to conduct separately, and thus a number of persons could unite in a work, the undertaking of which would be impossible for most of them separately. To grow a forest of any extent, deserving the name, requires a large capital ; the land must be purchased and put in order whether we pursue the plan of conservation of the natural growths or by sowing or planting anew. Not only for land, material, and labour, will money be required, and a good deal of it, but the returns will necessarily be slow. The long rotation of most trees put the profits of the harvest beyond a generation of men, hence they who plant can rarely expect to reap. This tree planting, however, is to be a permanent and a sure investment of capital, and being for a while without annual returns, it has little attraction for the poor man, who needs to keep his means in circulation. Like insurance, it is a continuous drain until the trees are established, but when they reach maturity the returns are eminently satisfactory. How many persons constantly bury their capital in the hidden recesses of the earth by taking stock in companies to explore and develope the mines, and wait for many years before the glittering gold appears in the shape of the coveted dividends. But men are led on by hope of the eventual returns.

The forest is a long investment, but a certain and safe depository for our means, where bountiful Nature is ever adding to the capital. The trees are growing while we are sleeping, and a well-managed forest is ever increasing in value, in it the rich lode may be worked continuously, the veins are never exhausted nor cut off, like those of the mine, by "horseback nor fault." Hence the desirability of such an investment, and in the corporation the combined small contributions of the many, in sums that they can spare by using economy, are enabled when thus aggregated to carry on works that would usually be possible only for the rich landed proprietors. Even small amounts of subscriptions to such stocks, aggregating a sufficiently large amount, will enable the company to procure land and proceed with the plantations.

The railways are already incorporated ; thanks to the lavish aid of our Government, they are in possession of millions of acres, they hold large principalities of lands just where forests are most needed to meet their own enormous demands for future construction and repairs, as well as to supply the necessities of the rapidly increasing populations which they invite into the country—and just where, for the sake of their influence upon climate, the forests are most required—for it is firmly believed that the disastrous storms, hurricanes and cyclones, that seem to be bred upon those arid regions, or on the mountains beyond them, will at least be greatly modified, if not entirely prevented on the plains, wherever a sufficient amount of the territory in question shall have been covered with trees.

These railroad corporations are wealthy and abundantly able to carry on such works. Years ago, some attempts were made by these Pacific roads, which, however, were rather experimental and intended to prove the possibilities of tree-growing on the plains ; but from lack of practical knowledge on the subject by those in charge, and for want of perseverance by the managers of the roads, these spasmodic efforts were abandoned during the financial panic. The Northern Pacific, under the persevering efforts of Mr. Leonard R. Hodges, and the Union Pacific with the enthusiasm of J. T. Allen, sustained by Land Commissioner Burnham, have again undertaken the good work, and within the past two years have been planting groves about the station houses along their lines—even where irrigation was necessary to sustain the trees. Experiments have also been made with

more extensive plantations of trees, which are intended for utility rather than mere ornamentation and comfort.

Some really important work worthy of note has been begun and has reached a degree of success. It was inspired by that noble and intelligent forest advocate and student, Prof. C. S. Sargent, Director of the Arnold Arboretum, near Boston. This refers to planting extensively by contract undertaken by Messrs. Robt. Douglas & Son, of Waukegan, Illinois, with the Missouri River, Fort Scott and Gulf Railroad, and also with a private gentleman of wealth, who is largely interested in the same road, but who has undertaken his planting as a profitable investment. These contracts are of such magnitude as to be of great importance, since they consist of one entire section for the railroad and nearly as much on private account. The data here given have been received from private correspondence with the gentlemen engaged in the work, and in part from a Boston newspaper, the *Herald*, which was in direct communication with the other contracting parties and therefore they are quite reliable.

The forest plantation referred to is owned by the M. R. & Ft. Scott & Gulf Railway, and is located at Ferlington, Kansas, in 37.30 North Latitude. The 560 acres planted on private account is four miles further south, both are on high dry prairie. The trees are planted 4x4 feet apart, except the White Ash which are set 4x2 feet. This locality is rather too far west and south for most of our eastern trees, but seems especially adapted to the Catalpa and Ailanthus.

Of the Catalpa, all *Speciosa*, 100,000 planted in the autumn of 1878 and the following spring, with three summers' growth, had reached eight and ten feet, with a diameter of trunk two to two and a-half inches. The 217,600 catalpas planted in the next season, with two summers' growth, had attained the height of four, five and even six feet. Despite the severe drouth of 1881, those planted in 1881, 155,000 catalpas, in one summer, made a growth of eighteen to thirty inches, with the terrible drouth that ruined the grain crop.

In the fall of last year 288,000 were planted, from these the tops were cut off above the collar as they were put into the ground.

The Ailanthus after growing two years had reached six and eight feet with diameter of two inches.

On the other tract the following amounts and acres were set out: Catalpas, 75 acres; Ailanthus, 40 acres.

White Ash, 60 acres, set two by four feet, which required 326,400 plants, making a total of 530,400 trees planted. This plantation was continued during the current season.

The catalpa plantation of 4x4 feet has been easily cultivated and has required no pruning. The trees that have three years' growth, required little care the third summer, and pruning can be entirely dispensed with. The tops shade the ground and prevent the growth of weeds; they are very uniform in size, so that they will stand 2,500 to the acre of contract size four to six feet.

In his letter, Mr. Douglas adds this item which will be of interest to the private planter: "From our past experience with this tree we think, in the case of farmers planting (the cost of trees being an object) they might be planted 6x8 feet with a hill of corn between the trees and a row of corn between the rows, this would require 680 trees, and would allow 2,040 hills of corn per acre. The tall growing corn would have the effect of close planting upon the trees. The corn might be grown three years after which the trees would meet and shade the ground."

The contract is thus described in the Boston *Herald*: "A Boston capitalist has contracted for the planting of 560 acres of prairie land in eastern Kansas. This contract is made with the Messrs. Robert Douglas & Sons, of Waukegan, Illinois, the largest and most successful raisers of forest-tree seedlings in the United States, and is peculiar and novel in its provisions. They agree, at a certain price per acre,—which would differ, of course, with different conditions and location,—to break and plough the land, prepare it for planting, plant not less than 2,720 trees to the acre, and cultivate these until they shade the ground and so require no further cultivation to keep down the weeds and strong natural grasses. At the end of this time, probably in three or four years, the trees will be delivered over to the owner, one cent being deducted from the final payment

for every tree less than 2,000 to the acre delivered, which must be at least six feet high at the time of delivery. The advantage of this plan, which is the one also adopted by the Fort Scott Railroad, is that the trees will be carefully planted and attended to by experienced men, for whose interest it will be to use the best plants, and to cultivate and care for them in the best manner, so as to be able to deliver the greatest number of trees in the shortest possible time, that they may get quick returns for the money invested in plants, planting, etc. Any plantation in which the trees are six feet high, and in which the ground is so shaded that weeds and natural grasses cannot grow, will require no further attention until the time comes for thinning them out for fence-posts, etc. The plan relieves the owner of the great risk always attending the early years of a plantation, and makes his investment practically safe. This plantation of 560 acres is to consist of 300 acres of the Western Catalpa, 200 acres of Ailanthus, and 60 acres which will serve as an experimental ground on which will be tested trees of several varieties, to be selected by Prof. Sargent, the director of the Harvard Arboretum. The Western Catalpa, a native of the low lands bordering the lower Ohio and the banks of the Mississippi in Missouri, Kentucky and Tennessee, is a rapidly growing tree, easily cultivated, and producing timber which, though soft, is almost indestructible when placed in the ground, and, therefore, of the greatest value for fence-posts, railway ties and similar uses. The Ailanthus will grow with great rapidity wherever the climate is not too cold for it, and in spite of its wonderfully quick growth, produces hard, heavy timber valuable for fuel, ties, cabinet work, or almost every purpose for which wood is used.

It is believed that this plantation will soon lead to the formation of others, both by the railroad companies and by individuals, or corporations chartered to plant and own timber lands in the prairie States. Eventually a great deal of capital will be invested in this way. The returns will be slow, and a man investing thus should consider that he is doing it for his children. But when the returns do come they will be enormous, even at the present price of lumber, and it must be remembered that, before a crop of trees planted now can be harvested, the price of ties and other forest products will be more than double in the Western States. An encouraging fact, and one which shows that public attention is being directed to the importance of providing for the future demand of such things is that the Iron Mountain Railroad Company, which runs for hundreds of miles through a heavily timbered region, and possesses in its own lands some of the finest White Oak on the continent, has also made a contract with the Messrs. Douglas to plant near Charleston, Mo., 100 acres of Western Catalpa as an experiment. They do this because catalpa ties have stood on their road scarcely affected by decay more than twelve years, and because this tree is so valued by the farmers for fence posts that it is already practically exterminated in Illinois, Indiana and Missouri, and so not to be procured for ties, although the Superintendent of the railroad is willing to pay three times as much as for the best White Oak ties. If the planting of trees is good policy for a railroad running through a heavily timbered country like Missouri and Arkansas, it will certainly pay for roads in Iowa, Nebraska, Minnesota and Kansas to do the same.

The conclusion of the reading of Dr. Warder's valuable paper was greeted with loud applause.

Hon. Louis Beaubien did not know much about the Catalpa, but could scarcely believe it was more durable than Canadian cedar.

Dr. Warder agreed that *Red* Cedar was highly durable, but required from one to two hundred years' growth before it was fully developed. Cedar was of slow growth, whereas the Catalpa was of use in two or three years. When you get a catalpa tree of six inches in diameter, you have a post worth planting, but a cedar of the same size grown in the United States, was valueless.

In the paper next submitted will be found some practical suggestions on the growing of forest trees from seed for the benefit of those who may feel inclined to raise their own trees.

HOW FARMERS MAY GROW FOREST TREES FROM SEED.

By D. W. Beadle, of St. Catharines, Ont.

It has occurred to me that there may be farmers who want to plant young trees, either for useful purposes or for ornamentation, and if they want to plant largely may find it impossible to get them in sufficient quantity from nurserymen, who generally confine their cultivation to fruit trees, and have not grown to any large extent forest trees for timber. But these parties can form a nursery of these trees themselves by procuring a small piece of ground and have it especially prepared and well manured, so that there will be strength in the soil for a few years, and then they can raise whatever kind of tree they want. Seeds of the elm, maple, ash and of the walnut and butternut can be found in almost any part of the Province. The important point in planting seeds is that they should be planted as soon as perfectly ripe. Some of our trees ripen their seeds quite early. The Soft Maples, the Dasycarpum and rubum and the elms, ripen their seeds in June. (Mr. Beadle here exhibited two seedlings of Soft Maple grown from this year's seeds.) These maples ripen their seed in June, and it should be gathered and sown at once so that you can get a tree of considerable growth before the winter season. The seed of the elms should also be sown at once ; it should be sown in drills not deeply, but covered very lightly. These small seeds require to be covered with only sufficient earth to keep them moist, and they will produce plants in a very short time, and gain sufficient strength to tide over the cold season. But it is not true of all the maples that they ripen their seed so early in the season. The Sugar Maple ripens its seeds late in the autumn, as well as the Ash-leaved Maple, and unless you wish to sow them in the autumn, you have to preserve them and sow them in the spring. If you are not in a position to sow the seed at once, and wish to keep them till the next spring, they should be mixed with sandy soil and kept damp, yet not so damp as to cause them to germinate, and not be allowed to get dry. In this way you may preserve them with safety. If kept dry in papers some of them will have vitality the following spring, but very many of them will not germinate next season, and the proper way to preserve them is to mix them with moist earth. Now comes the butternuts, chestnuts and walnuts ; these all ripen in the late autumn, and in suitable soils, may be planted as soon as gathered, and allowed to freeze and thaw with impunity, as they will not suffer therefrom, but will germinate freely in the spring. But in soils which heave out the nuts under the effect of alternate freezing and thawing, it will be better to mix the seeds with soil in sufficient quantity to keep them moist, and prevent them from moulding, and keep them until spring before planting, or they may be spread out very thin upon the ground, and covered with a sod, in which manner they will keep fresh. It is not necessary that the nuts be subjected to frost, that is a matter of perfect indifference ; the important thing is not to permit them to become dry. These trees can be grown in nursery fashion, until they attain sufficient size to be planted where they are to remain, especially the elms, maples and ashes. The nut-bearing trees will make better growth if they be planted in the nut where they are to remain.

The benefits actually resulting to farm crops from suitable shelter by hedges is set forth in the following letter to Dr. Warder, from L. B. Wing, Newark, Ohio.

Dr. Jno. A. Warder :

My Dear Sir,—In conversation with Mr. Chamberlain, I stated that the only wheat I raised in 1881 was upon the ground protected by my hedges. In your note of the 15th to me at Newark you ask me for particulars—they are not extraordinary, but I will give them :—

One prairie field about eighty rods in length was sown in the fall of 1880 with Fultz Wheat. The land had good natural drainage, and the wheat went into the winter with a good growth and healthy appearance. But the only part of it that withstood the severe

winter following was a strip from six to ten rods in width along the west side of the field, where it was protected by a tall *Osage Orange hedge*, and the snow which the hedge had intercepted and lodged upon it.

At harvest this strip yielded about eighteen bushels per acre—the remainder of the field nothing. At corn-planting time we had been tempted to plough up all this strip, but concluded to wait the outcome; but it was never worth cutting.

The value of this protection to the young wheat plants, which secured a partial crop on this occasion, might not be so obvious another year. With a more favourable winter they might be able to get on without it. But the shelter these hedges afford to *farm animals* will commend them in *every* year and in all seasons. I have upon this farm long lines of hedges that will turn any sort of farm stock. Upon the roadside it is kept at a height of four to five feet by *one* annual cutting in April or September. The rest of it has never been cut and most of this is twenty to twenty-five feet in height, with few gaps or weak places.

I never had any patience with the fellows who delight in telling me that my "hedges occupy too much room." When I commenced improving this farm it was *all* room—not a tree or shrub upon a thousand acres; and to-day with twenty acres in orchards, with seven miles of hedges, with a few acres in groves of forest trees, I haven't a single twig too much—*not half enough*—to meet what is an equitable requirement that I should contribute my share toward the amelioration of the climate in winter, for the favouring of rain-fall in summer, and for reasonable forethought and provision for those who are to come after me.

Those who are apparently so covetous of the little ground that my trees and hedges occupy can generally find upon their own farms undrained lands, unbroken and unproductive prairie, much greater in extent, which they have never yet found time to bring to profitable uses. I doubt if I have any land that pays me so well, even now, as that which is occupied by these tall hedges and wind-breaks. I have in mind two fields of twenty and forty acres, each well set in Kentucky blue-grass, their summer growth kept till the frosts came, making a thick soft covering, so that one might imagine that he was "walking upon a feather bed" as he passed over them. Our young Shorthorn steers were taken to these fields at the beginning of winter. The tall thick hedges upon every side enable them to shelter themselves, no matter from what quarter the wind may blow, and they do not seem to realize that

"The melancholy days have come,"

but they apply themselves diligently to the freshest of the blue-grass, and grow fat. This is the 21st day of February, and they have not yet been out of their pastures. Occasionally, upon a stormy day, they have been offered hay, which, for the most part, has been contemptuously rejected. Later in the season we shall give them a daily ration of corn and fresh pasture next summer, and before we realize it they will go upon the market as "export cattle."

Now, my dear friend and preceptor, I am sure you can make it clear to the Convention that this pleasant way of farming is not practicable upon the open prairie *fenced with barbed wire*, and, if you do, it will be my apology for drifting away from the particular subject of your inquiry.

Very truly yours,

L. B. Wing.

P.S. But, my dear sir, after the "Forestry Congress" shall have considered the subject of hedge planting and the extension and preservation of our woodlands upon *climatic considerations*, I hope the members will not fail to express themselves in regard to our national protective duty upon Canadian lumber. It is a strange policy to encourage the mowing down of our own forests by a duty upon logs and lumber brought across the lakes for the use of our people. The theory of protection in general is that it increases home production; this duty *destroys* the home production. Each year's cutting of our pine timber is now well ascertained in its extent, and the time when our supply will be

exhausted is not far distant and can he predicted with considerable accuracy. The profits of this destruction goes to the few men who own our pine lands, and is paid them by the many industries that manufacture and consume the lumber.

We need not flatter ourselves that when we shall have exhausted our own inheritance, and are then compelled to admit Canadian lumber free, that our neighbours will not add to the price of that which we have helped them to preserve, a sum equal not only to the duty which our Government now imposes, but also to the profits added which our land-grant railroads and lumber kings are now able to realize through lack of competition.

The sort of statesmanship which would offer bounties for tree planting, and at the same time restrict the importations of lumber for our own necessities, is as feeble as would be an attempt to preserve to this country the American bison by offering a premium for their propagation in your zoological garden, and at the same time give a bounty for their pelts taken from the herds of the great west.

L. B. W.

In every locality forest trees, in common with all other vegetable growths, are more or less liable to the attacks of injurious insects. In order that tree growers may be enabled to distinguish insect friends from foes, and to know how best to subdue injurious species, the following paper is submitted :

INSECTS AFFECTING FOREST TREES.

By William Saunders, London, Ontario.

The preservation of our existing forests, and the protection of new plantations designed in some measure to re-clothe denuded districts, also the establishment of wooded patches throughout the open prairie sections of the western portion of this continent, are all questions of primary importance to us, affecting as they will the climate, and thus the comfort and well-being of a large present and very large prospective population. The regularity of the crops of cereals and fruits is much influenced by the presence of shelter belts of forest, as these break the winds which would otherwise sweep unchecked over the open country, and by their shelter and shade prevent that rapid evaporation from the surface which so often results in the drying up of rivers and streams, causing drought at a time when moisture is most needed.

One of the influences which seriously affects the growth and preservation of forest trees is insect pests. These creatures, often insignificant in size, make up in numbers what they lack in individual power, and frequently by their depredations cast the shadow of disappointment over the hopes and aspirations of the lover of forest trees. These insidious foes sometimes attack the roots, feeding upon them or boring into them, and thus sap the foundations of the tree's existence ; they burrow under the bark, eating out channels or galleries through the sap wood, and materially interfere with the regular flow of the sap, or by the multiplication of these channels sometimes girdle the tree and cause its death. Some of the tiny hosts attack the smoother bark of the twigs and branches, and puncturing their surface suck the sap, the life-blood of the tree ; others burrow into the terminal shoots and cause their death ; while a large army of invaders feed openly upon the leaves, consuming their substance, and materially retard the growth of the trees they attack.

It would be impossible in a paper like the present one to refer in detail to the individual species composing these vast hordes—such particulars would fill volumes ; hence on this occasion we must content ourselves by dwelling on the general principles which are to guide us in our efforts to destroy these foes. When such destruction is practicable, and where direct human effort seems powerless or too insignificant in its result to be

worthy of trial, we must then endeavour to aid Nature in her efforts to restore the equilibrium, after which she is ever striving, by encouraging and protecting insect friends, which prey on the destructive species, also insectivorous birds and other useful agencies; in short, learn to distinguish our friends from our foes, and strive to protect the former while we destroy the latter.

To make our subject clearer we shall refer somewhat in detail to the habits and peculiarities of some common representative species in each of the departments referred to. As representing the root-boring insects, the broad-necked Prionus, *Prionus laticollis*, which sometimes attacks the roots of apple and pear trees. The sap-sucking insects attacking the root, the apple-root plant-louse, *Schizoneura lanigera*. The trunk borers will be represented by the maple borer, *Glycobius speciosus;* the maple egerian, *Aegeria acerni;* the northern brenthian, *Eupsalis minuta;* the pigeon tremex, *Tremex columba;* and the hickory and walnut borer, *Monohammus tigrinus*. Those which injure the branches, by the hickory twig girdler, *Oncideres cingulatus*, and the woolly louse of the pine, *Coccus pinicorticis*. Of the hosts which attack the leaves, reference will be made to the forest tent caterpillar, *Clisiocampa sylvatica;* the luna moth, *Actias luna;* the lime-tree measuring worm, *Hybernia tiliaria;* the poplar dagger-moth, *Acronycta lepusculina;* the pine leaf-miner, *Gelechia pinifoliella;* the oak leaf-miner, *Lithocolletis hamadryadella;* the white pine saw-fly, *Lophyrus abbotii;* and the hickory aphis, *Aphis caryalla*.

Attacking the Roots.

The Broad-necked Prionus—Prionus laticollis.

This insect bores into the roots of the apple and pear trees, and often injures the roots of grape vines. When full grown it is a very large fleshy grub, from two and a half to three inches long (see Fig. 1), of a yellowish white colour, with a reddish brown head, and a dull bluish line down the back. It eats its way through the centre of the root, and where the root it attacks is not very large,

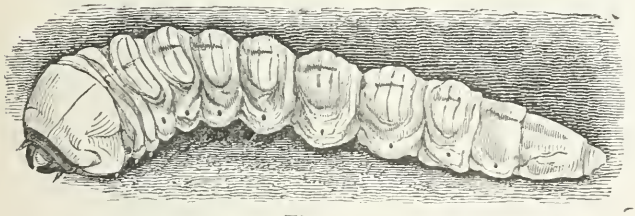


Fig. 1.

Fig. 2.

reduces it to a mere shell. It lives in the larval state some two or three years, and then changes to a chrysalis, as shown in Fig. 2, within the root; this change occurring in the summer season, usually towards the end of June.

About the middle of July the beetle appears. It is of a brownish black colour, about an inch and a half long, with strong thick jaws and rather slender antennæ or horns. It is well represented in Fig. 3. Its thorax is short and wide, and armed at the sides with three teeth; the wing-covers have three slightly elevated lines on each, and are thickly punctured. The figure represents a female; in the male the body is shorter and the antennæ longer.

Fig. 3.

The Apple-root Plant Louse—Mytilaspis gromi corticis.

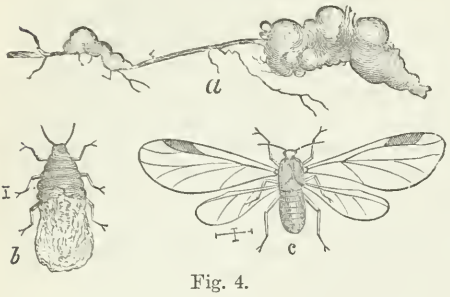


Fig. 4.

This insect works underground, and produces the odd-looking, gall-like excrescences often found on the roots. In Fig. 4, *a* represents an affected root, *b* a wingless louse, and *c* a winged specimen. These enlargements are all caused by minute lice, which may usually be found in considerable numbers in the crevices of the protuberances, where many of them will be seen, of a pale yellow colour, covered with a bluish white cottony matter, and along with these, larger winged specimens. The insects are nourished by sucking the juices of the tree obtained from the tender roots, by piercing them with their beaks.

A species of syrphus fly, known as the root louse syrphus fly, *Pipiza radicum*, preys on these lice, and devours immense numbers of them. In Fig. 5 this useful insect is shown in the larval and chrysalis state, as well as in the perfect condition, all the illustrations being magnified.

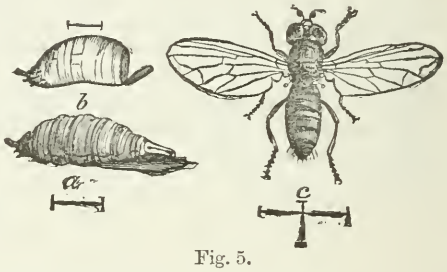


Fig. 5.

Attacking the Trunk.

The Maple Borer—Clytus speciosus.

This is a very beautiful insect, and may be readily distinguished by its brilliant black and yellow colours, giving it much the appearance of a large hornet, so much so, indeed, that few persons except entomologists care to touch it (see Fig. 6). It is a little over an inch long, and about three-tenths of an inch in width. The head is yellow, and furnished with powerful mandibles or jaws; the eyes and a band above them extending across the head, are black; the antennæ or horns are also black, and are curved somewhat after the fashion of those of a goat, a similarity which gave rise to their general name of *Capricorns* or goat-horns. The thorax is deep black, with two yellow oblique stripes on each side; it is very large, somewhat globular, and flattened or depressed above. The body is deep black, oblong, somewhat cylindrical, a little flattened above, and tapering behind. The elytra or wing covers have yellow bands, the first of which forms a regular arch, of which the keystone is composed of the yellow scutel or little shield-shaped spot at the top of the wings, just behind the centre of the thorax; the second band is in the form of the letter W, each V receiving a termination of the first band; the third band is nearly transverse, and placed across the middle; the fourth is bent obliquely backward, parallel with and near to a large terminal spot or band, which latter has a large black central spot on each wing case.

Fig. 6.

The elytra are each tipped with a short blunt tooth. The legs are long and yellow, with a brown line on the inner side of the thighs; they are made for standing securely, being very broad, and with the third joint deeply notched. The underside of the abdomen is reddish-yellow, variegated with brown. Fig. 6 represents the male. The female is larger and stouter than the male, and has rather shorter antennæ. She may also be easily distinguished by having a jointed tube at the end of the abdomen, which is capable of being extended or contracted at will, and is used for the purpose of conveying the eggs into the crevices or holes of the bark of the trees. These insects emit a shrill, screeching

noise on being handled or disturbed. This noise is caused by rubbing the joints of the thorax and abdomen together.

The beetles may generally be seen reposing quietly on the trunks of the trees during the day time, as they are more active at night, which period they select for their excursions in search of their mates. According to Mr. Harris, the bettle lays its eggs on the trunk of the maple in the months of July and August.

The larvæ hatched from these eggs are long, whitish, fleshy grubs, with deeply marked transverse incisions on the body. Their legs, which are six in number, are only rudimentary, and are of no service in locomotion; it is by means of the alternate contraction and extension of the rings or segments of the body that these little creatures force their way through the wooden tunnels in which they live, and in order to further assist their progress each segment is furnished with fleshy tubercles capable of protrusion, and which, being pressed against the sides of their retreats, enable them to thrust forward by degrees the other segments. As the grub has to feed upon very hard material it is provided with strong horny jaws, and the head, which is slightly bent downwards, is also covered with a strong horny skin. The grubs penetrate the bark, under which they lie dormant during the winter, and in the succeeding spring and summer they pierce further in, running long winding galleries up and down the trunk. The larvæ probably remain more than one year in this condition, and then change into pupæ, in which state they are at first whitish and very soft, but gradually harden and darken until the time arrives when the beetle is perfectly matured, and, forcing a passage through the outer bark, near which it has instinctively eaten its way whilst yet a grub, emerges into the open air.

This is a very injurious insect, which attacks chiefly the sugar maple. When present they can be readily detected by the sawdust and exuviæ that they cast out of their burrows, and in the spring, whilst still near the surface, it is quite possible to kill them by means of a stout piece of wire, or the judicious use of a good sharp knife.

The Maple Aegerian—Aegeria acerni.

While the borer last described is partial to the sugar maple this species is usually found injuring the soft or red maple. The several stages of the insect are shown in Fig. 7 : *a* represents the larva, *b* the cocoons under the bark, *c* the moth, and *d* the chrysalis forced through the bark.

The moth appears late in May and during June. When the wings are expanded it measures about three-quarters of an inch across; its wings are transparent, decorated with bluish-black markings. The head and palpi are of a deep reddish-orange, antennae bluish-black, thorax ochreous-yellow, abdomen bluish-black varied with ochreous-yellow and terminated by a tuft of brilliant reddish-orange hairs.

The under side of the body is ochreous-yellow with bluish-black markings.

The female deposits her eggs on the bark of the soft and sugar maple trees, chiefly on the former, and when hatched the young larvæ burrow through the bark and feed upon the inner portion and sap wood, never penetrating into the solid hard wood. The excavations made by the larva are filled with its brown castings. When full grown it is more than half an inch long, cylindrical to the eleventh segment, then tapering to the end, with the skin wrinkled and folded. The head is small, of a yellow color, cervical shield paler; stigmata brown; legs and tips of prolegs reddish. When the larva is full grown it eats its way nearly through the bark, leaving but a very thin layer unbroken; it then retires within its burrow, and having enclosed itself within a loose, silky cocoon, changes to a brown chrysalis. A short time before

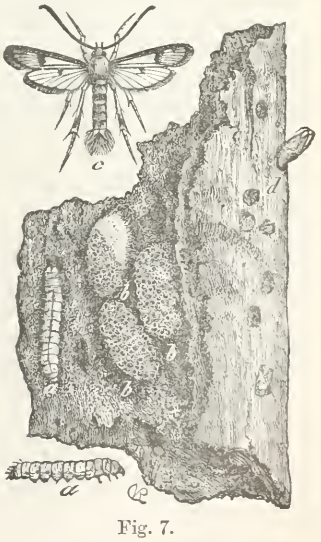


Fig. 7.

the moth escapes the chrysalis wriggles itself forward, and pushing itself against the thin papery-like layer of bark, ruptures it, and the chrysalis protrudes as shown in the figure. Soon afterwards the imprisoned moth in its struggles ruptures the chrysalis and escapes.

This insect appears to be increasing in numbers every year, and is very destructive, especially to young maple trees.

The Northern Brenthian—Eupsalis minuta.

This insect in the larval state bores into the solid wood of the white oak, forming a cylindrical passage. The larva is about three-quarters of an inch long, (see *a*, Fig. 8,)with a pale yellow head. It changes to a chrysalis *b* within its chamber and appears as a beetle *c* in June and July. This beetle belongs to the family of weevils, but differs from most of them in that its snout projects straight out in front and is not bent under as is the case with weevils in general. The male is very unlike the female, in the figure *c* represents the female, *d* the head of the male ; both sexes vary much in size.

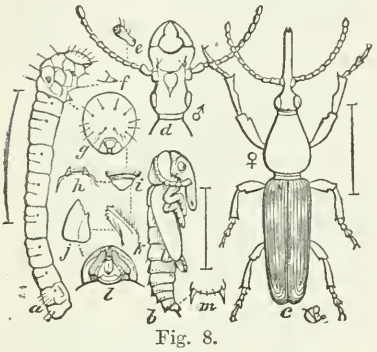


Fig. 8.

The female bores a cylindrical hole with her snout in the bark of the oak and deposits therein one egg which she pushes to the bottom. This shortly hatches, when the young grub works its way into the solid wood of the tree.

The Pigeon Tremex—Tremex columba.

This species belongs to the Hymenoptera or four winged insects. The female is shown in Fig. 9. It is a large, wasp-like creature, measuring, when its wings are spread, an inch and a half or more across. The wings are of a smoky brown colour and semi-transparent ; the body is cylindrical, and about an inch and a half long, exclusive of the borer, which projects about three-eighths of an inch beyond the body ; the head and thorax are reddish, varied with black ; the body black, crossed by seven yellow bands, all excepting the first two interrupted in the middle. The horny tail and a round spot at the base are yellow.

Fig. 9.

The male is unlike the female, is smaller in size, and has no borer. Its body is reddish, varied with black (see Fig. 10), the wings more transparent than those of the female, the body somewhat flattened, rather wider behind. Its length is from three-fourths of an inch to an inch or more, and the wings, when expanded, measure about an inch and a quarter across.

Fig. 10.

The female deposits her eggs chiefly in maple trees, but sometimes in hickory, buttonwood and elm, and also in pear trees. She bores into the bark with her borer, and drops an egg in the hole. The egg is oblong oval, pointed at both ends, and rather less than one-twentieth of an inch in length.

The larva is soft, of a yellowish-white colour, cylindrical in form, rounded behind, with a conical horny point on the upper part of the hinder extremity, and when full grown is about an inch and a half long. It bores deep into the interior of the wood.

The Twig Girdler—Oncideres cingulatus.

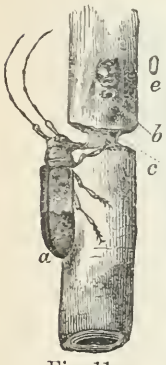


Fig. 11.

This beetle has the singular habit of amputating the twigs of the hickory and pear during the latter half of August and early in September. The female which is shown at *a*, Fig. 11, makes perforations in the smaller branches of the tree upon which she lives, and in these deposits her eggs, one of these punctures is shown in the figure at *b*. She then proceeds to gnaw a groove about a tenth of an inch wide, and about a similar depth all around the branch, as shown in the figure, when the exterior portion dies and the larva, when hatched, feeds upon the dead wood. The girdled twigs sooner or later fall to the ground, and in them the insect completes its transformations, and finally escapes a perfect beetle. The beetle is more than half an inch long, of a brownish grey colour, with dull reddish-yellow dots, and a broad grey band across the middle of the wing cases. The antennæ are longer than the body.

The Hickory and Walnut Borer—Monohammus tigrinus.

The larva of this insect bores under the bark and into the solid heart wood of these valuable trees, excavating chambers sometimes to the depth of two feet. The hole runs longitudinally upwards, enlarging as the worm increases in size, being in its largest part about half an inch in width, and a little less in depth. At its upper end it suddenly turns outward through the wood to the bark. Having prepared this outlet for the escape of the insect when it is perfected, the larva retires backward a short distance, and stuffs this upper extremity with its castings, for the purpose apparently of preventing birds like the woodpecker from detecting the burrow by its hollowness, thus showing astonishing instinctive foresight. This artifice is not always successful, for the acute ear of the woodpecker is not easily deceived, and these birds often detect the boring larvæ, drag them out of their retreats and devour them. All the lower portion of the gallery or chamber is filled with the fine powder-like castings of the insect which are of a brownish colour. The grub when full grown is about an inch and a quarter long, of a whitish-yellow colour, with a faint interrupted dark line down the back ; body smooth, broad on the anterior segments, tapering towards the extremity ; head black.

Within its mined chamber the larva changes to a chrysalis, and this finally to the beetle, which gnaws its way through the outer bark and escapes. Soon after escaping the beetles pair, and shortly after the female deposits her eggs upon the bark of the trees, and as soon as hatched the young grubs burrow into the wood and begin to destroy it in the manner already described.

The Woolly Louse of the Pine—Coccus Pinicorticis.

This shows itself in the form of a white cottony-like substance, growing upon the smooth bark, particularly below the axils, where the limbs spring from the main trunk, and often small white spots of this same substance are scattered irregularly over the whole of the bark of the limbs, particularly upon the north or shaded side. Trees coated with this substance soon become sickly and stunted in their growth. If a portion of the cottony substance be carefully removed there will be found underneath each tuft, a cluster of small lice huddled closely together and fixed to the bark.

Attacking the Leaves.

A multitude of insects devour the leaves of forest trees—prominent among these are the following :

The Forest Tent Caterpillar—Clisiocampa sylvatica.

This insect much resembles the common tent caterpillar, *Clisiocampa americana.*

The eggs (*a*, Fig. 12) are laid in clusters, fastened firmly around the small twigs of various sorts of trees, the number in each cluster being usually from three to four hundred. These are placed in position by the moth during the summer, and remain in this condition over the winter, and until the following spring. The young caterpillars hatch about the time of the bursting of the buds, and while small they spin a slight web or tent against the side of the trunk or branches of the tree on which they are placed. In this early stage they often have strange processionary habits; marching about in single or double column, one larva so immediately following another, that when crossing a sidewalk, or other smooth surface, they appear at a little distance like black streaks, or pieces of black cord stretched across. They grow rapidly, and in about six weeks attain their full size, when they are an inch and a half or more in length, (see Fig. 13), of a pale bluish colour, sprinkled all over with black points and dots. On the back is a row of ten or eleven oval or diamond shaped white spots, and on the sides, pale yellowish stripes, somewhat broken and mixed with grey. When about half grown or more, which occurs during the latter part of May, they are extremely voracious, and sometimes swarm to such an extent as to completely defoliate large patches of wooded land, and thus compelling the trees to start a fresh growth of leaves at a critical time during the hot weather, which injures them.

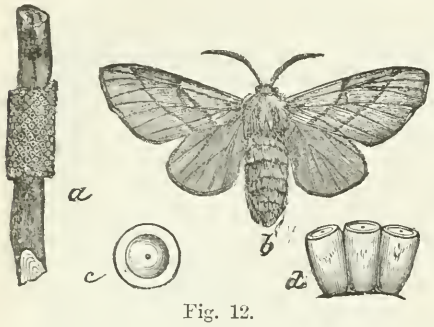


Fig. 12.

When the caterpillar is full grown it spins a cocoon usually within the shelter of a leaf, the edges of which are partially drawn together. The cocoon is whitish-yellow, oval in form, and closely spun with silk intermixed with a pasty substance, which, when dry, becomes powdery, and resembles sulphur in appearance. This cocoon is surrounded by an outer web of silk, loosely woven, and slight in texture.

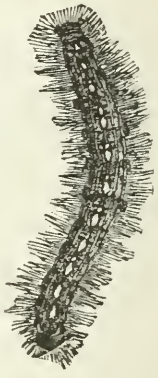


Fig. 13.

The moths (see Fig. 12 *b*), which appear early in July, are of a pale dull-reddish or yellowish-brown colour, crossed by two oblique parallel lines, which are darker than the rest of the wing. When the wings are spread the male measures about an inch, the female nearly an inch an a half across. After pairing, the female deposits her eggs in the manner already referred to, and shortly after dies.

The Luna Moth—Actias luna.

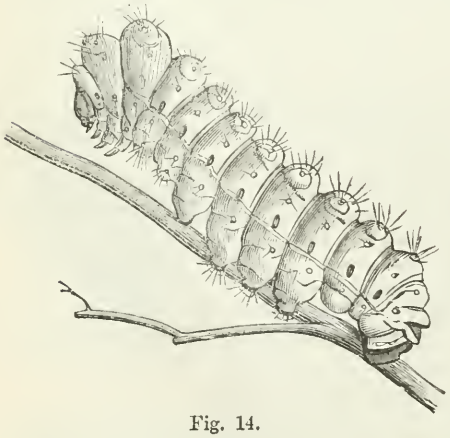


Fig. 14.

The larva of this magnificent moth feeds on hickory, walnut, butternut, and sometimes on beech and oak, and is shown in Fig. 14. It is, when full grown, about three inches long, of a clear bluish-green colour, with a pearly head, and a very pale yellow stripe along each side of the body; the back is crossed between the rings by transverse lines of the same colour. Each segment is adorned with small pearly warts, five or six in number, each furnished with a few short hairs.

When the caterpillar is full grown it draws together two or three leaves of the tree on which it has fed, and within this hollow spins an oval, close and strong cocoon of whitish silk, within which it changes to a brown chrysalis.

Fig. 15.

The moth, Fig. 15, measures, when its wings are spread, from four to five inches across. The wings are of a delicate green colour, thickly covered with pale hairs as they approach the body. There is a purplish brown stripe along the front margin of the fore wings, which stretches across the thorax, while a small branch of the same is extended to the eye-spot near the middle of the wing. The eye-spots are transparent in the middle, and margined with rings of white, yellow, blue and black; the hinder edges of the wings are bordered with purplish brown; the head is white; the antennæ feathered; the thorax thickly clothed with whitish wooly down, and the legs purplish brown.

The Lime-tree Measuring Worm—Hybernia tiliaria.

The larva of this insect is a yellowish looper or measuring worm, with a reddish head and ten wavy black lines along the back. It is shown in Fig. 16 in different positions. It is hatched early in the spring, and completes its growth about the middle of June, about which time it is often very destructive to basswood, elm, hickory and apple trees. When ready for its next change, the larva lets itself down from the tree by a silken thread, and buries itself five or six inches below the surface of the ground, and there changes to a chrysalis, from which the moth usually escapes the following spring, and occasionally some of the moths appear in October or November, but this rarely occurs with us.

The male moths have large and delicate wings and feathered antennæ, as seen in the figure. The fore wings, which measure, when spread, about an inch and a half across, are of a rusty buff colour, sprinkled with brownish dots, with two transverse wavy brown lines and a central brown dot. The hind wings are pale, with a brown dot about their middle.

The female, also shown in the figure, is a wingless, spider-like creature, with slender thread-like antennæ, yellowish-white body, sprinkled on the sides with black dots, and

Fig. 16.

with two black spots on the top of each segment, excepting the last, which has only one. The eggs are oval, of a pale colour, and covered with a net-work of raised lines.

The Poplar Dagger-moth—Acronycta lepus-culina.

The caterpillar of this moth is often very destructive to poplar trees, and more especially to the foliage of the cottonwood tree in the west. It is, when full grown, an inch and a half or more in length, with a black head and its body clothed with long, soft, yellow hairs, from amongst which arise along the back five long pencils of black hairs. When at rest it curls itself up on the leaf, as shown in Fig. 17

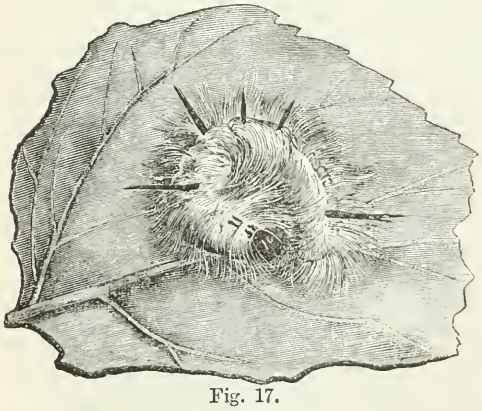


Fig. 17.

Fig. 18.

When full grown the caterpillar spins a pale yellow cocoon of silk, interwoven with its own hairs, hidden in some sheltered spot, and there changes to a dark brown crysalis, from which, in due time, the moth appears.

The perfect insect measures, when its wings are expanded, about an inch and three-quarters across. (See Fig. 18). Its wings are grey, varied with dark brown dots and spots and shadings. Near the hinder angle of the front wings is a rather conspicuous spot, not very distinctly shown in the figure, resembling the Greek letter *psi* placed sidewise. There are two broods of this insect during the year; the moths of the first appear in June, deposit eggs which produce larvæ that reach their full growth, pass the chrysalis

stage, and from which moths emerge about the end of July. The second brood of larvæ are found about the last of August and throughout September, they become crysalids late in the season, and pass the winter in the crysalis state.

The Pine Leaf-miner—Gelechia pinifoliella.

The leaf eaters of forest trees are not all large insects; there are legions of tiny foes, which make up in numbers what they lack in size, and thus inflict serious injury. As a specimen of this class is a minute moth, whose larva lives within the leaf of several species of pine. It may often be observed that the ends of pine leaves, and in many cases the entire leaves above their base, become dead and brown, and when opened are found to be entirely eaten out and to contain, if in the proper season, the larva or pupa of this leaf-miner. Fig. 19 (after Comstock) represents this insect in its various stages, much magnified; the short lines near the figures indicate the natural size. The caterpillar is light brown, narrow, and nearly cylindrical in form, with the head and shield on next segment black. The crysalis is long and slender, of a light brown when first formed, but becoming darker afterwards. The moth is brownish, the fore wings crossed by three white lines, the hind wings pale grey. The moth, when its wings are spread, measures only three-eighths of an inch across.

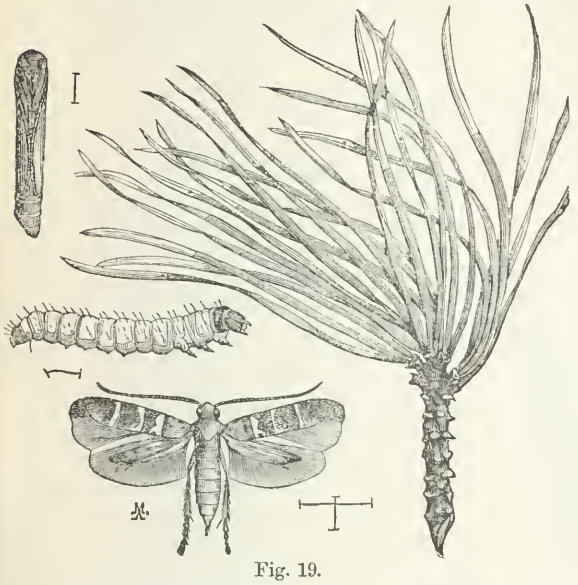


Fig. 19.

The Oak Leaf-miner—Lithocolletis hamadryadella.

This is another very small insect of the same class which injures the leaves of differ-

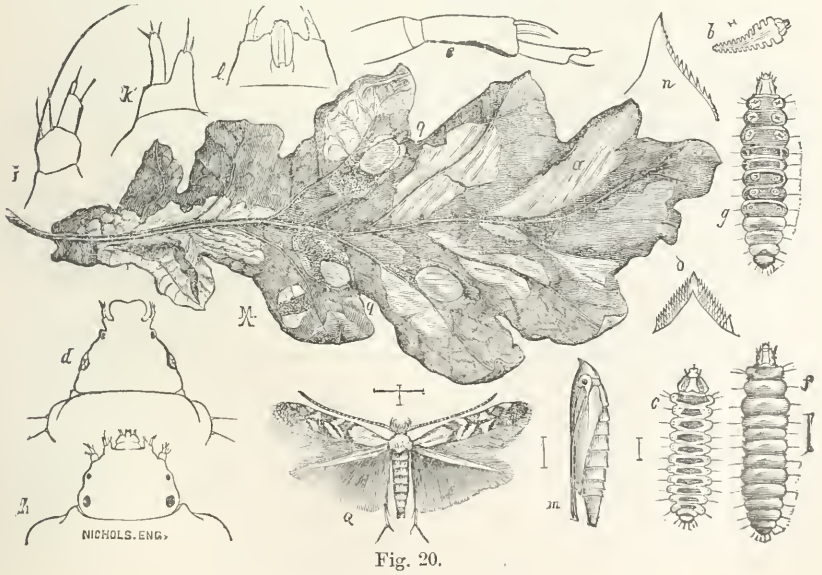


Fig. 20.

ent species of oak. In Fig. 20 (after Comstock) we have an oak leaf represented, covered with blotches. These are of a dull yellowish-white colour, and are caused by the larva of this insect, which lives between the upper and under skins of the leaf and consumes its substance. The young larvæ are shown at *b*, in the figure; *c*, *f*, and *g* represent the larva in the later periods of its growth; *m* the chrysalis and *a* the moth. Although each insect makes but an insignificant blotch on the leaf, yet they are sometimes found in such countless multitudes that almost every leaf has a colony of them, and this interference with the vital functions of the tree by the destruction of the foliage often seriously injures it, and sometimes causes its death.

The White Pine Saw-fly—Lophyrus abbotii.

Moths and their caterpillars are not the only enemies the tree grower has to contend with; foes of the most formidable character are found as well among other orders of insects. Probably, no insect is more generally destructive to the white pine than the pine saw-fly, belonging to the order Hymenoptera, which is represented in its different stages in Fig. 21 (after Riley). The larvæ, shown at *4* in the figure, are found in colonies, keeping together until full-grown, and after stripping the leaves off one twig or branch they pass on to the adjoining branches, until sometimes one side of a tree, or, if it be of small size, the whole tree will be denuded of its foliage and destroyed. They appear from midsummer until October, are nearly an inch long, of a yellowish-white colour, with three or four longitudinal rows of black spots. When mature they form tough, brown, pod-like cocoons attached to the twigs within which the change to a crysalis takes place, from which, in due time, the perfect fly escapes.

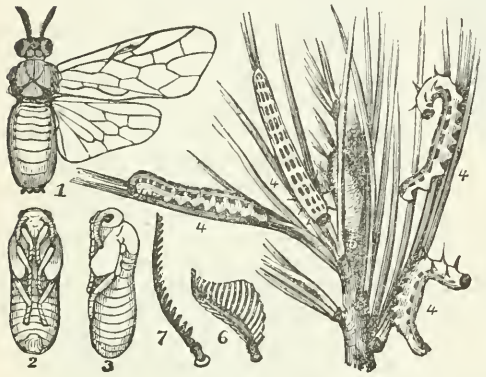


Fig. 21.

The Hickory Aphis—Aphis Caryalla.

This is a small yellow aphis which lives on the under side of the leaves of the hickory. Its antennæ are ringed alternately with white and black, the wings are transparent, without spots, and the legs yellowish white. This insect, in common with all other plant lice, lives by suction; it inserts its beak into the tissues of the leaf and lives upon the sap.

Having briefly referred to some representative species in each group of these insect enemies to forest culture, we now pass to the consideration of the remedies, natural and artificial, available for their destruction.

It is obviously extremely difficult, if not impracticable, to undertake to destroy or control by human agency, insects injurious to forest trees. The area covered by them is so great that the labour and expense connected therewith would be out of all proportion to the good likely to be accomplished. Artificial remedies are applicable only to street trees, small groups on the lawn or ornamental ground, or to plantations of young trees, where the depredators may be easily reached, and since such trees or groups are in most instances esteemed as of great value by the owners, and are objects of constant solicitude, they are worthy of special efforts for their preservation.

It is difficult to reach insects which make their home either on the surface or in the interior of the roots of trees. Where the presence of such insects are suspected, the surface soil should be removed and the superficial roots examined, when if convincing evidence of their presence is found, scalding hot water should be poured upon the roots thus laid partially bare, and the earth replaced. It has also been suggested to apply bisulphide

of carbon, a volatile fluid of a very nauseous odour, by first making holes in the ground by means of a crowbar, and pouring therein a little of this fluid, then closing the aperture and confining the liquid, which slowly vaporizing finds its way into the porous soil around it, for a considerable distance. This liquid has been used for the Phylloxera on the grape roots in France, and it is claimed, with much success.

Borers in the trunks of trees may be detected by the little heaps of sawdust-like castings, which are thrust out of the holes at the extremity of their burrows. Where such are seen, the culprit should be searched for and destroyed with a knife or by thrusting a pointed wire into the orifice. As a preventive measure, the trees should be coated early in June with an alkaline mixture, made by mixing a cold saturated solution of washing soda with soft soap, until the soap is reduced to the consistence of paint. This should be freely applied with a brush, from the base up to the crotch of the tree, and along such of the larger branches as may be within reach. If this is applied during dry weather, it will dry and form a coating not easily removed by rain. The parent insects avoid depositing their eggs on trees so protected, since the alkaline coating is distasteful to them, and would probably destroy any young larvæ hatching from eggs placed on it. As most of the perfect insects of borers appear during June and July, if this application is made early in June, and repeated in three or four weeks afterwards, the trees to which it is applied will be efficiently protected.

For the destruction of insects on the external surface of the bark, a similar alkaline wash would prove an efficient remedy.

All insects which devour the leaves of forest trees may be destroyed by syringing the foliage with water to which Paris green has been added, in the proportion of one or two teaspoonfuls of the powder to two gallons of water. If the Paris green be of the best quality, a teaspoonful to two gallons would be sufficient. It should be well mixed, and being a strong poison, care should be taken after using it to thoroughly cleanse the vessels in which it has been mixed, before using them for any other purpose. Powdered hellebore, which is not so very poisonous, may also be employed to advantage for the same purpose, by mixing an ounce of the powder with two gallons of water.

Where insects attack the terminal twigs of trees, and burrow into their substance, they can be destroyed by cutting off the infested twigs and burning them. Plant lice on the leaves of trees may be destroyed by syringing with strong tobacco water.

It is, however, to Nature's remedies that we must look mainly for relief, especially where large groves of forest trees are invaded. There are a vast number of insects which have been specially fitted to prey on other insects, and it is to them that we must mainly look for aid in subduing noxious species. Since their habits and modes of life vary greatly, we must, to make the subject clear, go a little into detail here.

Fig. 22.

Fig. 23.

First, we have the sand beetles, or tiger beetles, as they are sometimes called, *Cicindelidæ*, (represented by Figs. 22 and 23,) which are very active creatures, devouring whatever defenceless insect life may fall in their way. The beetles, of which we have a number of species, lay their eggs on the ground, and the larvæ, which are odd-looking humped-backed creatures, excavate for themselves small cylindrical holes in the earth of such a calibre that their large dull bronzy heads will just fill the orifice. They never leave these excavated chambers in search of food, but crawl to the surface and there place their heads in position, in such a way that the hole is exactly filled, and there patiently wait until some unwary insect strays within their reach, or walks over their heads, when the jaws suddenly open, the unsuspecting victim is seized, dragged down the hole and devoured at leisure. (This larva is represented by Fig. 24.) When the larva is full grown it changes to a chrysalis under the ground, from which, after a time, the perfect beetle escapes.

Fig. 24.

Next in order come the ground beetles, or carabidæ, of which we have in America,

north of Mexico, about 1,100 named species. These vary greatly in size, some when perfect are but little larger than fleas, while others attain a length of an inch and a quarter or more. The members of this immense family are, with very few exceptions, insect eaters in their caterpillar as well as beetle state. In both conditions they are very active, wandering about from place to place seeking whom they may devour. Some apply themselves to this useful work during the day time, while others are nocturnal in their habits. The larvæ of many of them, being soft-bodied and comparatively defenceless, live under stones and logs, or hide themselves in loose earth or rubbish. Every person interested in the destruction of noxious insects should so far acquaint himself with the general appearance of the members of this useful family as to be able to recognize them. The copper-spotted carab, *Calosoma calidum*, is shown in Fig. 25, and the green caterpillar hunter, *Calosoma scrutator*, in Fig. 26 ; these are among the largest and most familiar species. They often climb trees in search of canker-worms, tent caterpillars, and other injurious species, and consume them with great gusto.

Fig. 25.

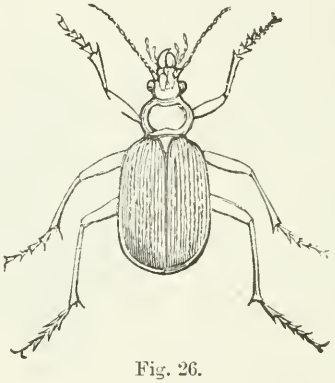


Fig. 26.

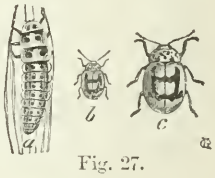


Fig. 27.

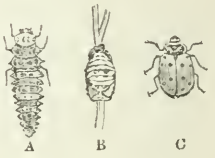


Fig. 28.

A third very useful family of beetles is that of the lady birds *Coccinellidæ*. These nearly all feed on insects, both as larvæ and beetles, and are especially fond of plant lice, *Aphides*. In Figs. 27, 28 and 29 some of our most useful species are shown in the larval, chrysalis and beetle stages, others are represented in the beetle state only, in Figs. 30, 31, 32, 33 and 34. Some of the beetles are known to devour the eggs of the

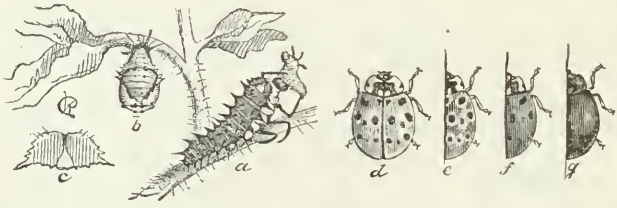


Fig. 29.

Colorado potato beetle, and in all probability they eat the eggs of other destructive insects as well. Were it not for these useful creatures we should soon have our trees

Fig. 30.

Fig. 31.

Fig. 32.

Fig. 33.

Fig. 34.

and shrubs swarming with plant lice, for the powers of reproduction among the plant lice are so enormous that, if unchecked by these active and efficient aids, their numbers would increase to an extent at present inconceivable. In addition to those enumerated, there are species belonging to some other families of beetles which, either in the larval or perfect state, feed on other insects; but the three great families named stand pre-eminently out among the most useful of the insect tribes.

Among the four-winged flies (*Hymenoptera*) we have also many active and useful friends. Some of the larger species of wasps feed on insects, and many of them lay up a store of insects as food for their young. When preparing for the sustenance of their successors these sagacious creatures make cells in the ground, and having placed an egg therein, pack the cells with a sufficient number of insects to sustain the young larva when hatched until it reaches maturity. The cell, when filled, is sealed by the parent, and in this the insect passes through its several stages of egg, larva, and chrysalis, finally escaping from this prison-house a perfect wasp, to continue its useful work. The fraternal potter wasp, *Eumenes fraterna* (Fig. 35), is one of these useful insects. All sorts of soft bodied insects are stored up in these wasp cells, especially caterpillars, and the wasps have the power either of so poisoning their victims that they do not die outright, but remain in a constant state of torpor, or else they inject some fluid into their bodies which preserves them, since they do not, when stored in these cells, undergo decay.

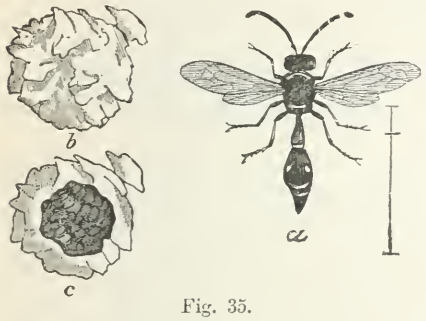


Fig. 35.

A far more important and useful family of insect killers are the ichneumon flies, which belong to the same order as the wasps. These active, sprightly creatures are all day long on the wing, searching everywhere, and prying into every nook and corner for caterpillars, in whose bodies they deposit eggs,

Fig. 36.

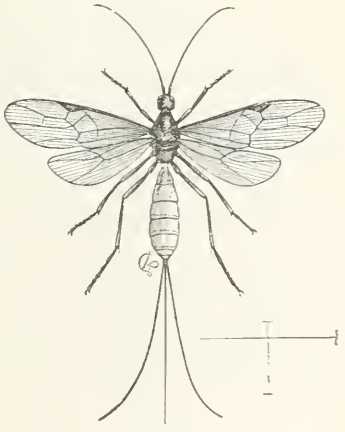


Fig. 37.

puncturing the skin and placing them underneath, where they hatch into tiny grubs, which sustain themselves on the bodies of their victims, avoiding the vital organs, but so weakening the caterpillars that they die either before or soon after passing into the chrysalis condition. In this manner myriads of caterpillars are yearly destroyed, the ichneumon usually changing to a chrysalis within the body of its victim, or spinning a cocoon upon its surface. In Figs. 36 and 37 representatives of this class are shown.

Among the two-winged flies, *Diptera*, we have also our useful allies. The Tachina flies, whose history is very similar to that of the ichneumons, are very numerous, and they destroy immense numbers of caterpillars; Fig. 38 illustrates one of these. The syrphus flies, elegant little creatures with golden bands across their bodies (see Fig. 39), deposit their eggs where plant lice are most numerous, and their larvæ, which are blind, grope around searching for the

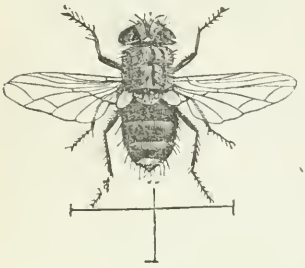


Fig. 38.

Fig. 39.

Fig. 40.

defenceless lice, which they greedily devour (see Fig. 40). The dragon flies, *Neuroptera*, are also worthy of mention, since they are great insect eaters, catching their prey on the wing and alighting to devour it.

Insectivorous birds are also useful helpers, although not so important as insect friends. Nearly all birds feed their young on insects, and hence, during the breeding season, consume large numbers of them, but they devour alike the useful and the injurious, the one as readily as the other, and are not at all discriminating in this important particular. From the observations thus far made it seems probable that birds do comparatively little to keep down injurious insects; that the even balance between the useful and the noxious species, when disturbed by the overdue accumulation of the latter, is set right mainly through the agency of friendly insects. This subject has not, however, been sufficiently studied to enable one to speak positively concerning it. In the meantime let us encourage the insectivorous birds, and do all we can to protect them.

CONCLUSION.

The delegates, in view of the information obtained at the several meetings of the American Forestry Congress, beg leave to make the following recommendations:

I. That such of the public lands as are more suitable for the growing of timber than for agricultural purpose, be retained by Government as a part of the public domain.

II. That within this timbered tract scattered portions be leased to persons suitable to act as forest police, to protect the timber lands from trespass, guard against fires, remove fallen timber, and act under instructions.

III. That no trees shall be cut, whether pine, spruce, hemlock, or hardwood, on any of the public timber lands under fourteen inches in diameter at the stump.

IV. That no cattle, sheep, or swine be allowed to roam at large in any of the public woodlands.

V. That the lighting of fires in or near any woods from May to October, inclusive, be prohibited, under severe penalties.

VI. That a general stock law be enacted, prohibiting cattle, sheep, and swine from running at large in any part of the Province, unless the municipal council of any municipality shall pass a by-law authorizing their running at large within that municipality.

VII. That encouragement be given to farmers to plant timber lots of not less than ten acres on each farm of one hundred acres, and maintain the same as a timber lot, from

which cattle must be carefully excluded. Such encouragement may be given by exempting the timber lots from taxation so long as the same are maintained and properly cared for.

VIII. That encouragement be given to farmers to plant and maintain shade trees along the public highways and the boundary lines of farms, by granting out of the Provincial treasury, a sum of ten or twelve cents for each tree so planted and maintained in a healthy and growing condition for a period of five years, provided the municipal council of the municipality in which they are growing shall have granted a like sum.

IX. That hereafter it be a condition in all sales or grants to settlers, that not less than twenty-five acres in every hundred shall be forever kept as woodland, under penalty of forfeiture of the whole, and that the covenant be made to run with the land.

X. That scientific and practical instruction in forestry be given to the students at the Agricultural College.

XI. That a competent conservator of forests be employed, with a sufficient staff, and clothed with adequate powers to see to the proper execution of all laws relating to the cutting of timber, lighting of fires, running at large of animals, etc., etc., within the timber lands of the Province.

XII. That as soon as practicable the management of the public forests be assumed by the Government, and all timber be cut and sold, trees planted, pruned, and cared for, and all matters relating thereto be conducted under the supervision of a chief forester.

XIII. That the grounds of the several public institutions be utilized as far as practicable as experimental stations, by planting thereon timber trees that promise to be of practical value, and testing their adaptation to these several localities.

XIV. That Government cause accurate maps to be made of each County, shewing the area that has been cleared off, that has been destroyed by fire, and that is yet covered with timber, and indicating as far as practicable the quality of the standing timber.

XV. That a forest of acclimation be established at the Agricultural College, Guelph, in which shall be planted such forest trees of other countries as may probably become acclimated in this country, and prove to be valuable for economical or ornamental purposes.

All of which is respectfully submitted,

D. W. Beadle,
Wm. Saunders,
Wm. Brown,
P. C. Dempsey,
Thos. Beall.

APPENDIX TO REPORT

OF THE

Commissioner of Agriculture and Arts.

APPENDIX (D).

REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, FOR THE YEAR 1882.

APPENDIX (D).

THIRTEENTH ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY

OF

ONTARIO,

INCLUDING REPORTS ON SOME OF THE NOXIOUS, BENEFICIAL AND OTHER INSECTS OF THE PROVINCE.

PREPARED FOR THE HONOURABLE THE COMMISSIONER OF AGRICULTURE BY THE OFFICERS AND MEMBERS OF THE SOCIETY.

1882.

To the Honourable the Commissioner of Agriculture:

SIR,—I beg to submit to you, herewith, the Annual Report of the Entomological Society of Ontario, prepared in compliance with the provisions of our Act of Incorporation.

The audited Financial Statement is submitted, as well as the transactions of the annual meeting, which was held this year in the City of Montreal, on August 24th. The Society is greatly indebted to your courtesy in enabling them to meet in Montreal, as an opportunity was thus afforded of obtaining the presence of a large number of scientists, who were attending the session there being held, of the American Association for the Advancement of Science.

I have, also, the honour to submit, herewith, for your approval, illustrated reports of various insects, which have been prepared by members of the Society.

In order to make these reports more useful and their information more accessible to those interested in them, the society has thought it advisable to prepare an index of the whole series that have been issued by the Department, and I trust that it will meet with

your approval. It will bear good evidence, that, through the Department, a vast amount of practical information has been given to the public respecting the habits and life history of the various insect friends and foes that abound in every part of the Province.

I am glad to be able to report that our Society still maintains the publication of the *Canadian Entomologist.*

During the year an application was made to the members of the Society by the Minister of Marine and Fisheries of the Dominion to furnish specimens, illustrating the natural history of insects serving as food for fishes, or which are destroyers of spawn, it being desired to exhibit them at the great International Fisheries exhibition to be held in London, England, in 1883.

The Society cheerfully complied with the request, and it is intended to prepare some forty cases as a Canadian exhibit.

I have the honour, sir, to remain,

Your obedient servant,

EDMUND BAYNES REED,

Secretary-Treasurer.

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The annual meeting was held in the rooms of the Natural History Society, Montreal, on Thursday, August 24, 1882, at 3 o'clock p.m.

The President, Mr. Wm. Saunders, of London, Ont., in the chair.

Present: H. F. Bassett, Waterbury, Conn.; Rev. C. J. S. Bethune, M.A., Port Hope; G. J. Bowles, Vice-President, Montreal; F. B. Caulfield, Montreal; Prof. J. H. Comstock, Cornell University, Ithaca, N. Y.; Prof. A. J. Cook, Agric. College, Lansing, Mich.; Wm. Couper, Montreal; T. Craig, Montreal; J. M. Denton, London; C. R. Dodge, Washington, D. C.; Prof. C. H. Fernald, State Coll., Orono, Maine; C. Fish, Brunswick, Maine; Jas. Fletcher, Ottawa; Rev. F. W. Fyles, Cowansville, P. Q.; Prof. H. A. Hagen, Mus. Comp. Zool., Cambridge, Mass.; W. H. Harrington, Ottawa; Prof. S. Henshaw, Boston, Mass.; Dr. P. R. Hoy, Rachine, Wis.; J. G. Jack, Chateauguay Basin, P. Q.; Dr. H. S. Jewett, Dayton, Ohio; Prof. J. A. Lintner, State Entomologist, Albany, N. Y.; H. H. Lyman, Montreal; B. Pickman Mann, Assist. Entomologist, Agricul. Dept., Washington. D. C.; Prof. C. V. Riley, Entomologist Agric. Dept., Washington, D. C.; Wm. Shaw, Montreal; E. D. Winble, Montreal; C. D. Zimmerman, Buffalo, N. Y.; E. Baynes Reed, Sec.-Treas., London, and others.

The minutes of the previous meeting were confirmed, the reading being dispensed with as they had been printed and sent to the members.

The President then addressed a few words of cordial welcome to the members present.

The report of the Council and the financial statement of the Sec.-Treas. for the past year were then read, and on motion, adopted.

REPORT OF THE COUNCIL FOR 1882.

In presenting their Annual Report, the Council desire to give some explanation as to the place and time of holding this annual meeting. Knowing that it had been determined that the American Association for the Advancement of Science would meet this year in Montreal, it seemed to your Council to be desirable to hold the annual session of the Entomological Society of Ontario at the same time and place.

The necessary application was accordingly made to the Hon. S. C. Wood, the Commissioner of Agriculture for the Province of Ontario, to sanction such an arrangement,

it being pointed out to him that the presence of so many distinguished Entomologists from the United States would have a most beneficial effect upon the meeting, and that the interests of the great agricultural community for whose welfare this Society is chiefly maintained would be promoted by the intercourse and exchange of thoughtful and useful suggestions from so large a gathering of practical entomologists, with this request the Commissioner most cheerfully and promptly complied.

The Council, moreover, felt that the holding of the annual meeting of the Entomological Society of Ontario, in the ancient City of Montreal, was the more desired on account of the presence there of those energetic entomologists through whose unwearied efforts the Montreal Branch of our Society has been so well sustained, and whose Ninth Annual Report, to be submitted to you to-day, affords additional evidence of zeal and interest in Entomology.

The Council are pleased to be able to report that the progress of the Society still continues.

After thirteen years of existence, the *Canadian Entomologist* may now be regarded as firmly established, and the Council trust that it may continue to receive in the future the same amount of valuable additions to our store of Entomological knowledge which in past years have given it a not unworthy place as one of the chief contributors to the Entomological Literature of America.

The demand from various European Scientific Societies, and others, for complete sets of the *Canadian Entomologist*, have rendered it necessary to reprint the first and second volumes. The Society can now, therefore, furnish copies of all the volumes.

During the last session of the Dominion Parliament the Council endeavoured to obtain for Scientific Societies the admission of books for their Libraries free of duty; in this they were disappointed, but they hope at the next session to be more successful, being convinced that it is an effort in the right direction, and that its success would prove a great benefit to the various Scientific Societies of the Dominion.

The Annual Reports of our Societies are being continued, and the Ontario Government distributes large numbers of them.

In the past year the Council have caused visits to be made to various places where insects were reported to be damaging crops, etc. Inquiry was made as to amount of injury being caused, and suggested practical remedies.

The Library of the Society is increasing. It is hoped that the catalogue—the printing of which has from various reasons been delayed—will shortly be issued to the members. The Council are glad to be able to report that they have secured a complete set of the valuable publications of Prof. Townend Glover, of Washington, D. C.

It is with regret that the Council learn that the sub-section of Entomology of the American Association for the Advancement of Science has been merged in the important section of Biology. The meetings of the sub-section in past years was a source of gratification to all attending them, and afforded excellent opportunities for furthering Entomological Science.

In the wide region, embraced by Section F., it is to be feared that the special interests of Entomology will suffer in some degree, and the Council would respectfully suggest that an effort be made to revive the Entomological Club, so that the members attending the meeting of the Association, while doing all they can to sustain Entomology in Section F. by reading of papers, etc., may have ample time for that full and free discussion of the details of our work which is so important to the progress of our special branch of Natural History.

The audited Report of our finances for the past year will be submitted to you as usual.

On behalf of the Council.

E. Baynes Reed,

Montreal, P. Q., Aug. 24th, 1882. *Secretary-Treasurer.*

ANNUAL STATEMENT OF THE SECRETARY-TREASURER OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, FOR THE YEAR ENDING AUGUST 19TH, 1882.

Receipts.

Balance from previous year, 1881	$ 73 92
Members' fees, sale of *Entomologist*, etc	253 48
Government grant, 1882	1000 00
Collector's material: pins, cork, etc	38 36
Interest on Bank account	9 01
Engraving—received for electrotypes of cuts	3 25
	$1,378 02

Disbursements.

Canadian Entomologist: printing, paper, stationery, etc	$390 32
Library	317 17
Expenses of Report for 1881, including engraving, electrotypes and woodcuts	291 95
Annual vote to Editor and Secretary-Treasurer	175 00
Rent	80 00
Insurance	12 00
Sundries: postage, etc	55 60
Balance	55 98
	$1,378 02

We certify that we have examined the above with books and vouchers, and found the same correct. Balance in Bank and Secretary's hands, fifty-five dollars and ninety-eight cents.

CHARLES CHAPMAN,
H. B. BOCK, } *Auditors.*

Entomological Society Rooms, London, Ontario.
August 19th, 1882.

The report of the Montreal Branch was submitted and read to the meeting:—

MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Ninth Annual General Meeting of this Branch was held on Tuesday, 16th May, 1882, at eight o'clock p.m., at the residence of H. H. Lyman, Esq., President.

The following report was read and adopted:—

REPORT.

In presenting their Ninth Annual Report, your Council would congratulate the members on the continued prosperity of the Society, and the undiminished interest manifested by all in the study of our chosen branch of Natural Science.

We have held eight pleasant and instructive meetings during the year and three new members have been added to our list. We have, however, lost by resignation an old and valued member, Mr. Robert Jack, of Chateauguay Basin, who has always felt a deep interest in our success, and manifested it in many ways.

Six original papers have been read during the year, as follows:—

1. Notes on some Species of *Hymenoptera* occurring at Montreal, by F. B. Caulfield.
2. On Instinct in Insects, by G. J. Bowles.
3. The Pickled Fruit Fly (*Drosophila ampelophila*), Loew, by G. J. Bowles.
4. On the *Genera Hepialus* and *Sthenopis* in Canada, by G. J. Bowles.
5. Notes on the *Genus Callimorpha* in the Museums of Boston, by H. H. Lyman.
6. List of *Lepidoptera* collected by Dr. Bell, of the Geological Survey, in 1881, at Sault Ste. Marie, etc., by H. H. Lyman.

Also a selected paper by H. H. Lyman, entitled "Insects as Medicine."

Our library has been increased by a valuable donation of books, reports, etc., from the parent Society in London, Ontario, for which the cordial thanks of this Branch are justly due. We have also received "Psyche" for the current year, but have not expended any of the funds in books.

The whole respectfully submitted,

H. H. Lyman,
President.

Montreal, 16th May, 1882.

The following were then elected to office for the ensuing year:—

H. H. Lyman, President (re-elected); W. Couper, Vice-President (re-elected); G. J. Bowles, Secretary and Curator (re-elected). Council—F. B. Caulfield, J. G. Jack, and E. D. Wintle.

Adjourned.

Geo. Jno. Bowles,
Secretary.

The election of officers then took place, when the following gentlemen were duly elected:

President, Wm. Saunders, London; Vice-President, G. J. Bowles, Montreal; Secretary-Treasurer and Librarian, E. Baynes Reed, London. Council—Rev. C. J. S. Bethune, Port Hope; J. Fletcher, Ottawa; Rev. F. W. Fyles, Cowansville; W. Couper, Montreal; J. M. Denton, London; J. Alston Moffatt, Hamilton; W. H. Harrington, Ottawa. Editor of *Canadian Entomologist*, Wm. Saunders. Editing Committee—Rev. C. J. S. Bethune, J. M. Denton, E. B. Reed. Auditors—H. B. Bock and C. Chapman, London.

The President then delivered his annual address, for which he was unanimously tendered a vote of thanks, together with a request to publish it in the *Canadian Entomologist.*

ANNUAL ADDRESS OF THE PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

Gentlemen,—For the first time in the history of our Society, we meet within the limits of the Province of Quebec. Although belonging to Ontario, and sustained in our work mainly by the liberal aid granted us by the Government of Ontario, our sphere of usefulness extends throughout the length and breadth of this great Dominion, and also across the lines into the United States. We have long had an active Branch of our Society in Montreal, comprising members who have materially aided in the advancement of Entomological Science, and now at this particular juncture, when so large a body of distinguished scientists were to honour Montreal with their presence, and among them many noted Entomologists, no time, it was thought, could be more opportune than this in which to hold the Annual Meeting of our Society, and by the kind permission of the Hon. S. C. Wood, Commissioner of Agriculture for the Province of Ontario, we are privileged to meet here on this occasion.

During the past season that dreaded pest, the Hessian Fly, has prevailed to a con-

siderable extent in Ontario. My attention was first called to it this season during the last week in July, when the grain was ripening. On visiting the wheat fields in the vicinity of London, I found the insect very prevalent, and in some instances I believe the injury to the crop must have been fully twenty per cent. The affected stalks were lying on the ground, and the grain in the heads imperfectly developed; on pulling these they would often break at the point where the insect had been at work, that is, about the base of the first or second joint. On examining the affected stalks, the insect was found to be in what is known as the puparium or flax-seed state, from the resemblance which it bears in this condition to a grain of flax-seed. The attention of farmers was drawn to the depredations of the insect by a communication to the press, and information sought as to the extent of the evil. From letters received from various sections of the Province, it is evident that the insect prevails over an extended area, and that the sum total of the loss entailed on the agricultural community in Ontario from this cause would figure up to a large sum, probably hundreds of thousands of dollars. In 1876 and 1877 this insect appeared in considerable force, and seriously injured the wheat crop in many parts of our Province, but since that time we have enjoyed comparative immunity from it until now.

The Hessian Fly belongs to the order of *Diptera*, or two-winged insects, and is about one-tenth of an inch long, with dusky transparent wings fringed with fine hairs There are two broods during the year. The flies which appear in the autumn, deposit their eggs, from one to twenty or more, on a plant in the cavities between the ridges of the blades or between the stalk and sheathing base near the roots of the young fall wheat. These hatch in four or five days into tiny grubs, soft, smooth and shining, which work their way down the leaf to the base of the sheath, about the crown of the root. Here they fasten themselves head downwards to the tender stalk, live upon the sap, and gradually become imbedded more or less in the substance of the stalk. When once located the larva moves no more, but growing rapidly, soon becomes plump, and when mature is about one-sixth of an inch long, greenish, and semi-transparent; before long it changes to the flax-seed state, in which condition it remains throughout the winter. Early in spring the flies are produced, which deposit their eggs about the first or second joint of the stalk, where they pass through their several stages, assuming the flax-seed state a few weeks before the wheat ripens, from which the flies hatch in August and September.

The effects of the presence of this insect in the young fall wheat is to weaken the plants, which become unhealthy, turn yellow and sometimes die. Often there is a gall-like swelling or enlargement of the stalk near the base, in and about which the insects will be found. The unhealthy plants contrast strongly with the rich green of the vigorous uninjured grain. The late brood may be easily found by separating the leaf from the stalk of the young wheat in October or November; the early brood, as already stated, in the reclining stalks, which, when very numerous, makes the wheat appear as if "lodged" in patches.

Various measures have been recommended for the destruction of this insect. Some have advised the immediate threshing of the wheat and the burning of the straw; but since most of the insects are left in the stubble this would be labour lost. Tearing up the stubble with a cultivator immediately after harvest, and raking it into heaps and burning it, is another suggestion; but this involves much labour at a time when the farmer is extremely busy, and during the process many of the insects would necessarily be shaken out of the stalks and escape. Burning the stubble in the field where practicable is a much wiser course; but it must be borne in mind that this process involves the destruction of the friendly parasites which feed upon the enemy, as well as the enemy itself. In my address to you two years ago, I expressed the opinion that we were almost wholly indebted for such immunity as we enjoy from destructive insects to the insect parasites which destroy them. Subsequent experience has confirmed this view, and any measure which involves the destruction of these useful friends should be adopted with caution. I am happy to state that from specimens reared within the past few days, I find that a large proportion of the Hessian Fly is being destroyed by parasites this season. Late sowing has been much recommended, and the results seem to

prove that on the whole this is the most practicable remedy—to defer sowing until about the 20th of September, by which time most of the flies will have disappeared. Late sowing, however, has the disadvantage that the plants not being so well established, are not as well fitted to withstand the severe weather of the winter. High culture is advantageous, as the luxuriant growth which the young wheat makes under such circumstances will enable it better to withstand the weakening effects of the grubs. Among the other measures recommended are pasturing the wheat fields with sheep, and the application of lime to the young wheat to kill the larvæ.

During the past few weeks I have examined the roots of a number of sickly-looking grape vines about London, Ontario, and have found the root-inhabiting form of the *Phylloxera vastatrix*, the dreaded scourge of the vine in Europe, in considerable numbers on the young rootlets, and have been able to clearly trace the diseased condition of those vines to that cause. I am convinced that this insect prevails to a greater extent than may at first be suspected throughout our Province, and that it is inflicting material injury, for besides having found it common about London, I have satisfactory evidence of its presence in the neighbourhood of Grimsby, where many vines are reported as diseased, and have also found it recently injuring the vines at Paris, There are no symptoms which indicate the first onset of this insect. It is only after the *Phylloxera* has destroyed a large portion of the roots, that the vine assumes a sickly aspect, becoming stunted in its growth and yellow in the foliage. On examining the roots of a vine so affected, most of the small rootlets—through which the vine draws the chief part of its nourishment—are found dead, and with many small knots and swellings on them. If a few freshly formed, living rootlets can be found, which may in such cases be looked for about the crown of the vine, these minute lice will usually be seen clustering upon them, often surrounded by groups of their eggs, and causing little swellings thereon. But it frequently happens that when the vines have reached this depleted condition, no insects can be found; they have entirely left them, and traversing the interlacing roots of other vines, found their way to richer pastures.

This insect occurs in two very different forms; in one, known as the gall-inhabiting type, it is found upon the vine leaves, producing in June, July and August globular or cup-shaped galls of varying sizes, of a greenish red or yellowish colour, with their outer surface uneven and somewhat woolly. The enlargement is on the under side of the leaf, and if one is cut into, it will be found to contain from one to four orange coloured, wingless lice, and a large number of very minute, oval, pale yellow eggs, with some newly hatched lice. Soon the gall becomes too thickly populated, when the surplus lice wander off through its partly opened mouth on the upper side of the leaf, and establish themselves on the same leaf or on adjoining leaves, where the irritation occasioned by their punctures causes the formation of new galls, within which the lice mature and increase. These galls are quite common, especially on leaves of the Clinton and other thin-leaved varieties, also on the wild grape; they sometimes occur in such abundance as to cause the leaves to turn brown and fall prematurely from the vine, and instances are recorded of defoliation from this cause. Late in the season, as the leaves become less succulent, the lice either perish or seek other quarters, and some of them find their way to the roots of the vines and establish themselves as already described, where, with their change of habit, there follows a slight difference in their appearance. During the winter they remain torpid, renewing their activity in the spring. As the summer advances, a portion of the root lice acquire wings, when they issue from the ground, and rising in the air, they fly or are carried with the wind to neighbouring vineyards, where they deposit their eggs on the under side of the leaves, among their downy hairs, beneath the loosened bark of the branches and trunk, or in crevices of the ground about the base of the vine. The complete life history of this insect, which is extremely interesting and curious, may be found in the 5th, 6th, 7th and 8th Reports on the Insects of Missouri, by Prof. C. V. Riley.

The gall-inhabiting type of this insect may be subdued by picking off the infested leaves and destroying them, but the root inhabiting type is a much more difficult form to deal with. Various applications to the soil have been recommended, such as bisulphide of carbon, and carbolic acid diluted with water and poured into holes made in the

soil about the roots; soot, lime and ashes have also been suggested, strewed around the vines.

Several species of predaceous insects prey on this louse. A small fly, an undetermined species of *Diplosis*, deposits its eggs within the gall, in which the larval and pupal stages of this insect are also passed. The larva of this friendly species, although destitute of legs, is very active, and groping about within the hollow of the gall, seizes on the young lice as hatched and sucks them dry. I have found no evidence of its attacking the parent lice, the newly born and tender progeny being more to its taste, and in sufficient abundance to furnish it with a constant supply of fresh food. In some instances one larva, in others two are found in a single gall, but in no instance have I found living lice with the chrysalids, an evidence that its beneficial work is completed before this change takes place. An active mite, *Tyroglyphus phylloxera*, the larva of a Syrphus fly, *Ripiza radicans*, also the larva of a small dull-coloured Lady-bird, a species of *Scymnus*, all aid in keeping in subjection the root-inhabiting form.

Most of our American vines are much more vigorous than the European sorts, and hence are likely to endure the inroads of this insect much better. As the insect is native to our country, our vines must have always been subject more or less to its attacks, and hence probably have developed a hardier constitution, with greater capacity for endurance or resistance. Last year I observed on some Concord vines evidences of unhealthiness, which I now believe arose from the presence of Phylloxera; this season most of them seem to have recovered their natural vigour. This inspires the hope that some of our vines may be able to endure the presence of this pest without very serious injury or loss.

During the month of July I received from Prof. J. A. Lintner, State Entomologist of New York, specimens of parasitized egg of the Gooseberry Sawfly, *Nematus ventricosus*, which he kindly sent me for the purpose of enabling me to introduce the parasite into Canada. This parasite is a very minute four-winged fly, probably *Trichogramma pretiosa*, with very delicate fringed wings. Some of these I placed while still unhatched near to eggs of the Sawfly recently laid on currant leaves. It is sincerely hoped that the effort for their introduction into Ontario will be successful, as they seem to do their work very thoroughly, every egg in the examples sent me being parasitized. The presence of the parasite may be detected by the discoloration of the egg, which becomes brown.

Recently I have received from a correspondent in Oakville, Mr. M. Felan, some examples of the destructive work of *Systena frontalis*, on grape vine leaves. This beetle, although very generally distributed, has not, as far as I know, ever been recorded before as destructive or noxious. In this instance it seems to be quite local in its abundance, as my correspondent informs me that they are not found on his neighbour's vines, although very abundant and destructive on his own, eating the green tissues of the leaf on the upper side and causing it to wither.

Examples of what appears to be a new disease on the pea have lately been brought to my notice from several localities, under the impression that it was caused by an insect. The disease manifests itself in a series of white fleshy swellings at short intervals along the fibrous roots, varying in size from one-sixteenth of an inch to one-eight of an inch or more in diameter, irregular in form, and of a solid fleshy structure. Microscopical examination has convinced me that it is a fungus growth in the production of which insects play no part. It appears to have the effect of stunting the growth of the plants and lessening the crop.

The short fruit crop this year, after the abundant promise of the spring, has been by many attributed to the work of insects, but this I am satisfied is an error, for while in many instances a small amount of injury has been done by insects, the main causes of the failure must be looked for elsewhere. Insects are important agents in the fertilization of fruit blossoms, and at the time of the abundant blossoming of the past season wet weather prevailed with an unusually low temperature, which prevented the insects then on the wing from visiting the flowers; the low prevailing temperature may have also interfered with the proper maturing of the fertilizing agent, while the frequent rains washed away from the opening flowers much of the pollen as formed. To these causes combined may probably be attributed the lack of fertilization of the blossoms. Following

this unfavourable weather, and doubtless induced and fostered by it, a species of minute fungus attacked the leaves of the apple, extending over a large portion of their surface, and often down the leaf-stalk to their base, causing a dark brown discoloration. The same fungus attacked the young fruit also, deforming a considerable proportion of the few specimens which were to be found, and these attacks resulted in a withering and curling of the leaves; the young fruit became stunted and deformed, and in many instances much of the foliage dropped to the ground. The effect of this injury, even at this advanced period in the season, is still to be seen in the sparseness of the foliage on many of the trees, in the discoloration of the leaves and the stunted growth of the branches.

It is difficult to anticipate with any certainty the effect of this disease on the fruit crop of next year, but since as a rule any interruption to the healthy growth of a tree leads to the more abundant production of fruit buds, it is probable that with a favourable season, we may have a very abundant yield in 1883.

California has for some years past been shipping fruits from her abundant surplus to all parts of the continent, and her favoured climate furnished conditions under which pears, apples, plums and grapes prospered to an extent unknown elsewhere, and for many years almost free from the insect pests which in other fruit-growing regions levy so heavy a tax on the growers. But this exemption could not be expected to be permanent. The Codlin Moth made its appearance there in 1874, and ever since then has been increasing to an alarming extent, the climate favouring its propagation with a rapidity unknown in less favoured districts, so that there are three, and in some instances four broods in a season. They attack the pears and quinces, as well as the apples, and destroy and disfigure a large quantity of fruit. California fruit growers are also suffering from the Phylloxera, Pear-tree Slug, Red Spider, Tussock Moth Caterpiller, the Currant Borer, a native Tent Caterpiller, *Clisiocampa constricta*, and a number of species of bark lice or scale insects, which attack apple, pear, peach, plum, orange, lemon, fig and olive trees, being found alike on the bark, foliage and fruit, and which multiply with amazing rapidity. Recognizing the vast importance of the fruit crop to the State, the most stringent measures are being enacted for the purpose of subduing these pests. An Act was passed by the State Legislature in March, 1881, in the interests of Horticulture and Viticulture, providing for the appointment of a State Board of Commissioners, one from each of the large fruit-growing districts, with almost unlimited powers to restrain, seize, or prohibit the importation of anything and everything likely to aid in distributing these insect pests—any suspected vines, vine cuttings, empty fruit boxes or other material likely to spread insects or contagion, and any willful violation of the quarantine regulations of this Board is considered a misdemeanor and punishable with a fine of from $25 to $100. These Commissioners are also charged with the duty of preparing rules to be observed by fruit growers for the extermination of insects, and suitable powers are given them to enforce the carrying out of these rules. In reference to the Codlin Moth, every apple grower is compelled to scrape the rough bark off his apple trees every spring, to collect and burn the scrapings, and apply, after scraping, an alkaline wash—the constituent parts of which are specified—to the tree. All boxes in which apples, pears or quinces have been stored or shipped are required to be dipped in boiling water containing a pound of commercial potash to each 25 gallons, for at least two minutes. These measures look to the destruction of the pupa. But, further, bands of cloth or paper of a specified width must be fastened around each apple, pear and quince tree, before the fifteenth day of May in each year, and examined every seventh day afterwards throughout the season, and all larvæ or pupæ destroyed. Precautionary and remedial measures are being enforced in reference to many other destructive insects, and any laxity or omission on the part of fruit growers in carrying out the instructions of the Commissioners is punishable by fine. The chief officer of the Commission is required to visit, examine and report upon the fruit growing interests in the various sections of the State, appoint resident inspectors for each county to enforce the regulations adopted by the Commisson, and to experiment on the best methods of subduing insects and diseases destructive to fruits, and disseminate the information so obtained. For the carrying out of these objects an appropriation is made by the State of ten thousand dollars a year.

Those interested in Economic Entomology will, I am sure, watch with much interest the effect of such vigorous legislation, and if measures of this character can be successfully enforced there, why not elsewhere ? There seems to be a necessity for the general adoption of some stringent measures which would prevent the careless and lazy from making their grounds the breeding places of noxious insects which prey upon and destroy the crops of their more thrifty neighbours.

I have the honour to be,

Yours very sincerely,

Wm. Saunders.

There being no further business, the meeting of the Entomological Society of Ontario was then adjourned.

The meeting then resolved itself into an informal gathering of the Entomological members of the American Association for the Advancement of Science, then in session in the city of Montreal.

On motion, Mr. W. Saunders and Mr. E. B. Reed were requested to act as Chairman and Secretary respectively of the meeting.

Some discussion took place respecting the Entomological Club of the A. A. A. S., when it was moved by Dr. Hagen, and seconded, and duly carried :

Resolved,—That Prof. J. A. Lintner be requested to take the necessary steps to call further meetings of the Entomologists present at this session of the Association, at such times and places as might be determined upon, and also to provide for similar meetings for Entomological discussions at the future gatherings of the Association.

PEA FUNGUS.

Mr. Geo. McCloskie, of Princeton, N. J., asked for some information about a peculiar fungus-like growth on pea roots, referred to in Mr. Saunders' address. The Chairman gave it as his opinion that it was a fungus.

Samples were shown exhibiting the pea as affected by this disease.

COTTON WORMS.

Mr. Jas. Fletcher asked if there was any further information respecting the habits of the Cotton Worm Moth, *Aletia argillacea*, he believing that from its frequent occurrence in Ontario in such a perfect condition, it must breed in Canada ; he was aware that the larva had never been found here and that Prof. Riley had in his able paper on this moth, expressed his conviction that the moth did not breed in Canada.

Prof. Riley stated that so far as he knew from repeated observations and experiments, the cotton plant, *Gossypium*, was the only food plant of this insect ; he thought that the peculiar formation of close-fitting scales of the wings would account for the apparently fresh condition of the moths found in Ontario, and he believed that the insect possessed ample powers to fly such a distance as that from the Southern States to Canada. There might be a probability that the insect bred in the Northern States, but he was still of the opinion that the moth was a purely Southern species.

Dr. Hoy stated that he had found in Wisconsin a specimen of the moth at the end of August, with the fore and hind wing on one side of the body in a deformed and crippled state, evidently showing that it must have very recently emerged from the chrysalis. He also stated that a female moth had been captured near his residence about the middle of June. He thought the insect must breed in the North sometimes.

Prof. Comstock confirmed Dr. Hoy's statement as to the finding of the crippled moth, but thought, however, that the moth generally bred in the South.

Prof. Fernald said he had seen fresh specimens taken in September, in Maine.

The Chairman said that occasionaly fresh moths and butterflies might be captured in

entirely new localities, but that generally some probable reason could be given for their appearance ; as, for instance, he remembered that many years ago two fresh specimens of *Euptoieta columbina* had been found at St. Catharines, Ont., a place where they had never before or since been observed, but that they had probably found their way there among the large number of fruit and other trees imported from the States ; still, however, no such probable reason had been suggested for the appearance of the Cotton Worm Moth in Ontario, in such frequent numbers and at so many different localities. The matter was one of great interest.

Mr. Fletcher said he hoped the members would continue their observations of this insect, the larva of which, if found in Canada, would probably feed on some *Malvaceous* plant.

Prof. J. A. Cook stated that from the European larch he had taken about 250 cocoons of *Samia Columbia*, and found among them one peculiar cocoon, very similar to that of *Columbia*, which eventually produced a *cecropia*.

Dr. Jewett thought it was probably a case of hybridism, as he himself had taken hybrids of *Gloveri* and *cecropia*.

Dr. Hagen had seen cocoons of *cecropia* so similar to those of *Columbia* that it would be very hard to discriminate between them.

Dr. Hagen also gave a very interesting account of an expedition to the Northwestern Territories from which, in company with Prof. Henshaw, he had just returned.

In the north of Washington Territory he found the forests and country generally in splendid condition, and comparatively free from any insect pests.

In other parts he had found the Yellow Pines most seriously affected by the attacks of *Pieris marsupia* (?), large tracts of forests being entirely devastated—and large trees being attacked as well as the younger ones. The Butterfly appeared there last year for the first time—eggs were found on July 24th. The larva has the habit of dropping from the trees by a thread, a peculiarity only noticeable in a very few of the Rhopaloceræ.

A tree once attacked never seems to recover, and the only way to check the ravages of the insect is to cut down those trees affected.

In Montana the cattle feed out all the year round on the " bunch " grass, which is of inestimable value to that country. A curious fact to be noticed is that wherever timothy and blue grass is introduced it seems to kill out the bunch grass, so that the advance of civilization may in fact entirely alter the economy of the country.

The grasses do not seem to be troubled as yet with any pests.

The Colorado potato bug is merely known in certain localities.

The fruit trees are troubled only by flies and ants, so that the territory is nearly free from noxious pests.

Prof. Henshaw said the expedition was one of great interest.

A curious feature was the late hours at which insects appeared to feed, many of them after sundown.

Papalio machaon was found in great numbers.

Carabidæ were found in dry places, whereas in the East they usually preferred moist situations.

The genus *Callopteryx* was also found. This was especially noticeable as it had never been known to occur west of the Rocky Mountains.

After this a considerable time was spent in informal discussion and examination of interesting specimens brought by members from various parts of the continent, and the meeting then adjourned.

POPULAR PAPERS ON ENTOMOLOGY.

ENTOMOLOGY FOR BEGINNERS.

The Southern Cabbage Butterfly—*Pieris protodice.*

By W. Saunders, London, Ontario.

In figure 1 we have represented the male, and in figure 2 the female of the Southern Cabbage Butterfly, an insect by no means confined to the South, although much more abundant there than in the more northerly portions of America. This insect enjoys a wide geographical distribution, extending south-west as far as Texas, west to Missouri, north-west to the Red River, and along the east from Connecticut to the Southern Atlantic States. A few years ago it was not uncommon around London, and occasionally quite plentiful about the shore of Lake Erie at Port Stanley; but of late years it has become a rare insect with us, and we have not met with a specimen on the wing for several years. The English Cabbage Butterfly, *Pieris rapæ*, seems to have taken its place entirely.

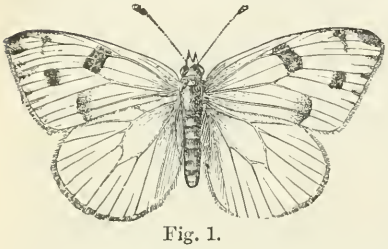


Fig. 1.

The butterfly is a very pretty one, as will be seen by the figures. The ground colour in both sexes is white, with black spots and black and dusky markings which are much more numerous in the female than in the male. Although so rare in Ontario that it has never, as far as we know, been reported as injurious, it is frequently very destructive to the south of us. According to Mr. Riley, it is abundant in Missouri, and often proves exceedingly injurious, sometimes destroying in a single district thousands of dollars worth of cabbages.

Fig. 2.

The caterpillar when full grown (figure 3, *a*), is about an inch and a quarter long, of a bluish-green colour, with four longitudinal yellow stripes and many black dots; when first hatched it is of an orange colour with a black head. The chrysalis, shown at *b* in the figure, is about seven-tenths of an inch long, of a light bluish-grey colour speckled with black, with the ridges and prominences edged with buff or flesh-colour, and having larger black dots.

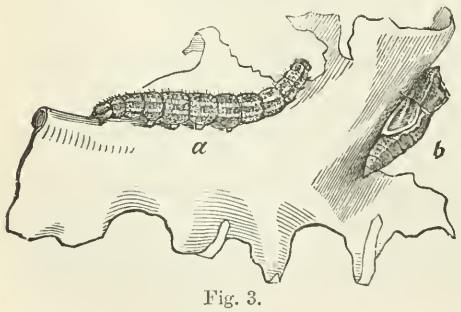


Fig. 3.

The insect hybernates in the chrysalis state, and where common may be found on the wing during the months of July, August and September.

The Great Leopard Moth—*Ecpantheria scribonia* Stoll.

The larva of this insect is comparatively abundant in the autumn throughout most of the Northern United States and in many parts of Canada. It is found feeding on various species of plants, but most commonly on the wild Sunflower, *Helianthus decapetalus*. It is about two and a half inches long, with a shining black head shaded with reddish on the sides, and a brownish black body. Each segment has an irregular transverse row of tubercles from which spring tufts of rigid shining black hairs, while the

spaces between each segment from the fourth to the tenth inclusive are banded with red, the bands being widest and most conspicuous from the sixth to the ninth inclusive. These bands are a striking feature in the appearance of the caterpillar, especially when it is coiled up as shown in figure 4 (after Riley). The colour of the under side varies from reddish to yellowish brown, feet reddish, prolegs brown, thickly clothed with short hairs.

This larva attains its full growth in the autumn and hybernates during the winter under logs, the loose bark of decaying trees, or other suitable hiding places. By the genial warmth of spring it is aroused from its torpid condition and feeds for a few days on grass, or almost any other green thing it may meet with. It then constructs a loose cocoon, within which it enters the chrysalis state.

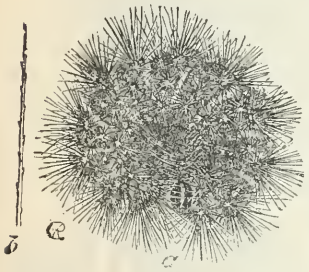


Fig. 4.

The chrysalis is black with a beautiful bloom on its surface, which is easily rubbed off; it has a flattened projection at its hinder extremity, which is tipped with a few bristles.

After remaining about a fortnight in the pupa state, it appears as a unique and very beautiful moth. In figure 5 (after Riley) *a* represents the female, *b* the male. The wings are white, ringed, streaked and spotted with dark brown as shown in the figure. The thorax has ten or twelve black spots with a bluish white centre; the upper portion of the body is steel blue, streaked along the middle and sides with yellow or orange; legs white, ringed with black at the extremities. The male differs from the female mainly in his smaller size and narrower abdomen.

Fig. 5.

The Polyphemus Moth—*Telea Polyphemus*.

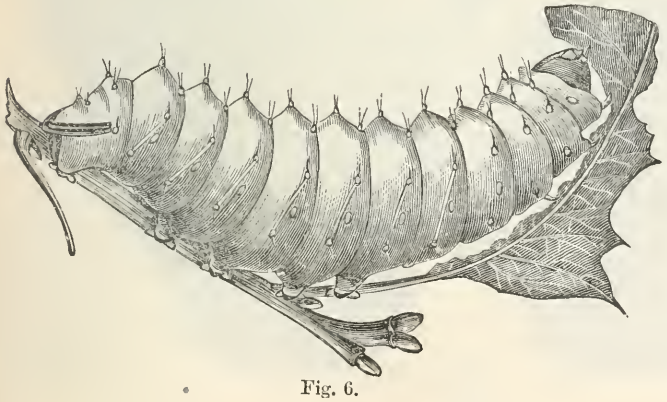


Fig. 6.

The caterpillar of this insect is also known as the American Silk Worm, in consequence of its having been extensively reared for the sake of its silk. When full grown the larva presents the appearance shown in figure 6, is over three inches in length, with a very thick body. It is of a handsome light yellowish-green colour, with seven oblique pale yellowish lines on each side

of the body; the segments, which have the spaces between them deeply indented, are each adorned with six tubercles, which are sometimes tinted with orange and have a small silvery spot on the middle, and from each one of which arise a few hairs. The head and anterior feet are pale brown, the spiracles pale orange, and the terminal segment bordered by an angular band resembling the letter V, of a purplish-brown colour.

When mature the caterpillar proceeds to spin its cocoon within an enclosure usually made by drawing together some of the leaves of the tree it has fed upon, some of which are firmly fastened to the exterior of the structure. The cocoon, fig. 7, is a tough pod-like structure, nearly oval in form and of a brownish-white colour, and within it the larva changes to an oval chrysalis of a chestnut brown colour, represented in fig. 8.

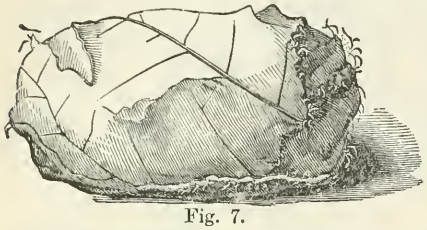


Fig. 7.

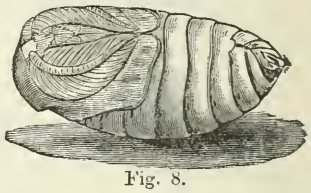


Fig. 8.

Usually the cocoons drop to the ground with the fall of the leaves, and in this state the insect passes the winter.

Late in May or early in June the prisoner bursts its prison house, when there is revealed a large and most beautiful moth, the male of which is well shown in fig. 9, the female in fig. 10. The antennæ are feathered in both sexes, but more widely so in the male than in the female. The wings, which measure, when expanded, from five to six inches across, are of a rich buff or ochre yellow colour, sometimes inclining to pale grey or cream colour, and sometimes assuming a deeper, almost brown colour. Towards the base of the wings they are crossed by an irregular pale white band, margined with red; towards the outer margin is a stripe of pale purplish white, bordered within by one of deep, rich brown. Near the middle of each wing is a transparent eye-like spot, with a slender line across the centre; those on the front wings are largest, nearly round, margined with yellow, and edged outside with black. On the hinder wings the spots are more eye-like in shape, are margined with yellow, with a line of black edged with blue above, and the whole set in a large oval patch of rich brownish-black, the widest portion of the patch being above the eye-spot, where also it is sprinkled with bluish atoms. The front edge of the fore wings is grey.

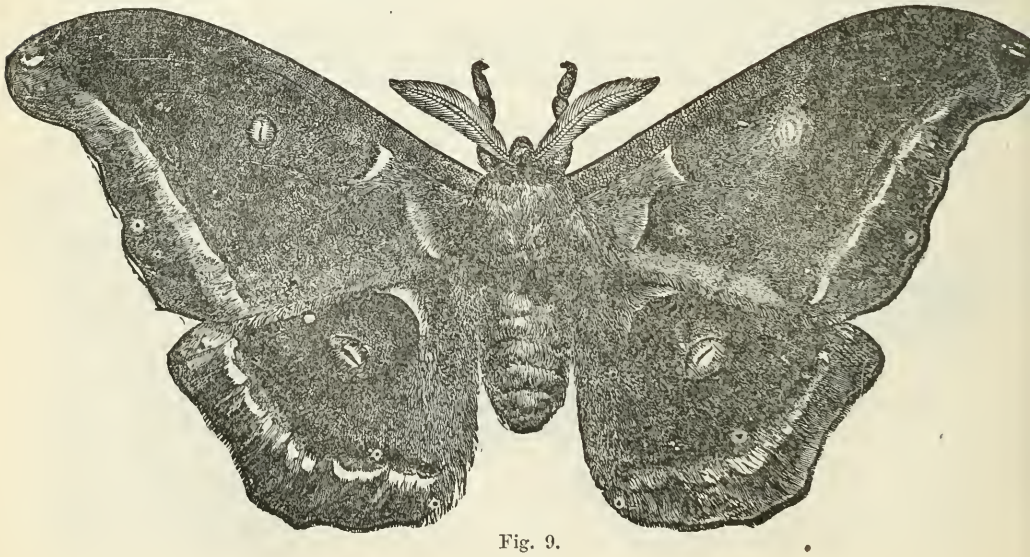


Fig. 9.

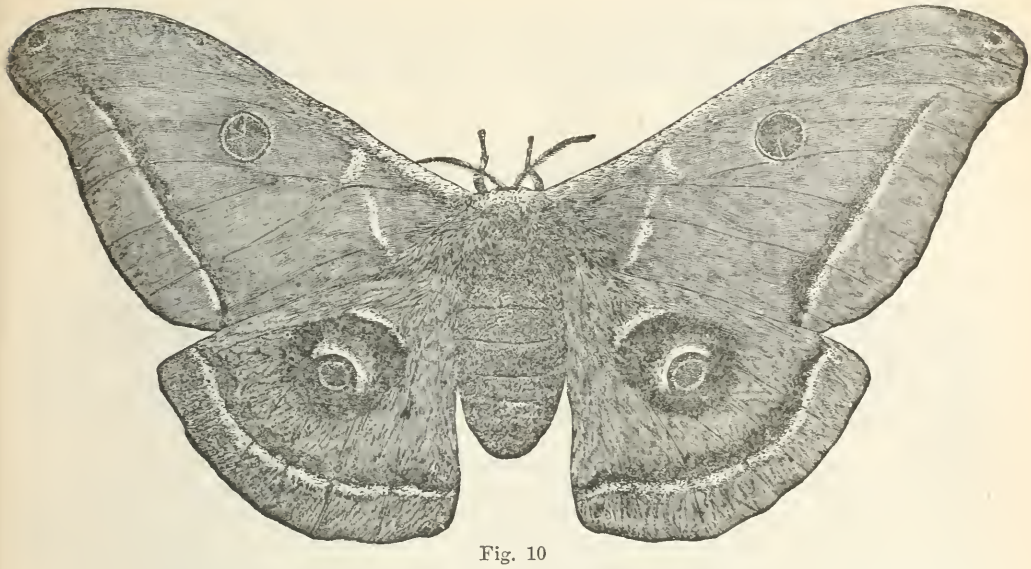


Fig. 10

This lovely creature flies only at night, and when on the wing is of such a size that it is often mistaken in the dusk for a bat. Within a few days the female deposits her eggs, glueing them singly to the under side of the leaves, usually one only on a leaf, but occasionally two or even three may be found on the same leaf.

The egg is about one-tenth of an inch in diameter, slightly convex above and below, the convex portions whitish, and the nearly cylindrical sides brown. Each female will lay from two to three hundred eggs, which hatch in ten or twelve days.

This insect is subject to the attack of many foes, particularly while in the larval state. A large number fall a prey to insectivorous birds, and they also have insect enemies. A large ichneumon fly, *Ophion macrurum*, see fig. 11, is a special and dangerous foe. This active creature may often be seen in summer on the wing, searching among the leaves of shrubs and trees for her prey. When found she watches her opportunity, and places quickly upon the skin of her victim a small oval white egg, securely fastened by a small quantity of glutinous substance attached to it. This is repeated until eight or ten eggs are placed, which in a few days hatch, when the tiny worms pierce through the skin of the caterpillar and begin to feed on the fatty portions within. The *Polyphemus* caterpillar continues to feed and grow, and usually lives long enough to make its cocoon, when, consumed by the parasites, it dies; in the meantime the ichneumons, having completed their growth, change to chrysalids within the cocoon, and in the following summer, in place of the handsome moth there issues a crop of ichneumon flies. It is also subject to the attacks of another parasite, a tachina fly. Should the insect ever appear in sufficient numbers to prove troublesome, it can be readily subdued by hand-picking. This larva feeds on a variety of trees and shrubs, such as plum, oak, hickory, elm, basswood, walnut, maple, butternut, hazel, rose, &c.

Fig. 11.

As this moth has been found to be easily propagated, extensive experiments have been tried with the view of producing silk for commercial purposes from the cocoons. The silk is rather coarser than that of the common silk worm, *Bombyx mori*, has a continuous thread and can be readily unwound. A measure of success has attended these

efforts, but not sufficient, it appears, to secure their continuance, and we know of no one now raising these larvæ for the purpose of obtaining silk for commerce. The insect has also been introduced into France with a similar object, but with what success we have not learned.

A NEW APPLE TREE PEST.

By Charles R. Dodge, Washington, D. C.

As if the apple tree with its sixty or more insect enemies were not sufficiently afflicted, a distant relative of the Canker-worm has been making itself so notorious in Georgia, as to give apprehension of the total destruction of apple orchards in the locality infested. The insect complained of is *Eugonia subsignaria* Pack., a measuring worm which at times has been a veritable nuisance upon shade trees in New York and Philadelphia.

In pursuance of my duties as a Special Agent of the Census Office (in the fruit interest), and through subsequent correspondence, the following facts were obtained from Mr. Adam Davenport, of Fannin County, in the state named. In his first communication, received some months since, it is stated that the worm made its appearance upon Rich Mountain, a spur of the Blue Ridge, about four years ago, attacking forest and fruit trees; and that it had since spread over a large area, doing great damage. Apple trees in June last were as destitute of leaves as in mid-winter, the fruit growing to the size of marbles and falling off.

A late communication—with the replies to a series of questions—shows the destruction to be even worse than at first reported. I give Mr. Davenport's own words:—

"The insect made its appearance four years ago upon Rich Mountain, since which time it has been spreading in a northern semi-circle, at the rate of about fifteen miles a year. It is by far the most interesting insect that has plagued this country since the first white settlement. So wonderfully prolific that in two years it literally covered every tree, bush and shrub, and with the exception of a few varieties, stripped them of their leaves.

"The egg hatches about the first of May, and the caterpillar, which is dark brown, lives about forty days, transforms to a chrysalis, lives in this state about ten days, and emerges a milk-white miller. For two weeks before the first transformation the fall of their excreta, in the woods, resembles a gentle shower of rain, and from its abundance tinges the streams a dark green hue. I have seen trees that had been stripped of their foliage, entirely wrapped up in their silken webs, resembling, when covered with dew, a wrapping of canvas. They constitute a great feast for all insectivorous birds and animals; it is said that even cattle and sheep eat them with great greed. They have an instinctive way of protecting themselves by losing their hold upon the limb, at the slightest touch, and swinging by their web in the air. For this reason they are easily shaken off into sheets and destroyed. However, they are so numerous, this remedy is worth nothing except in keeping them off very small trees. This instinct is not lost after leaving the caterpillar state, for if a bird alights upon a tree above the millers, they suddenly drop like a shower of snow to the ground for protection."

In the *Practical Entomologist*, volume 1, page 57, an anonymous writer gives an account of this insect's attacks on elms in Philadelphia. Dr. Packard, in his Monograph of the Geometrid Moths, page 528, mentions only elm as a food plant: but Prof. Thomas, in his second Illinois Report, page 243, says: "I have not noticed them feeding upon that tree, but have twice found them feeding upon apple, upon the leaves of which I have reared them to the perfect insect. In neither case were they numerous." Prof. Comstock makes brief mention of the insect in his recent report as United States Entomologist, quoting Mr. Davenport, as above, to the effect that the worms were destroying forests of hickory and chestnut, and were damaging fruit trees. This statement doubtless refers to the season of 1880.

The infested district in Georgia is not less than sixty miles long by forty wide, and embraces Union County on the east, Gilmer on the west, and Polk County, Tennessee, on the north. They have been injurious two years, but in the summer of 1881 they were most destructive.

It is stated in the *Practical Entomologist* that the eggs are deposited in masses of fifty upon the limbs of the tree. A piece of apple bark before me presents an irregular patch over three inches long, and one-fourth to one-half inch broad, the eggs closely crowding upon each other. As there are many hundreds, they have doubtless been deposited by a number of moths, which attests the truth of Mr. Davenports's statement regarding their falling in showers like snow.

They are deposited for the most part on the under side of the limbs on the top of the trees, and not only upon the bark, but the tufts of moss are covered by clusters of them. The eggs are smooth, dull, irregularly ovoid, slightly flattened upon the sides, rounded at the bottom, while the top is depressed, with a whitish rim or edge, forming a perfect oval ring; colour yellowish brown, resembling brown glue; length of examples before me, ·04 inch; width, lying upon the flattened side, ·03 inch; thickness, or smallest diameter, ·02 inch. They are deposited in curved or straight rows of a dozen or more (or less), these lines forming masses often of many hundreds.

The name *Eugonia subsignaria*, is given on the authority of Mr. Davenport, supported by his descriptions in answer to my questions, as I have had no means of determining the species. There is no doubt in my mind, however, of the insect's identity.

The Hop-Vine Borer.

The casual reader, calling to mind only the half dozen hop-vines usually seen about the kitchen garden, or trailing upon some farm out-building, can hardly realize the possible losses to hop growers by insects. According to the last census (for 1879) New York State alone had over 39,000 acres in hop yards, producing nearly 22,000,000 lbs. of hops, which, at an average of 28c. per lb., would aggregate a value of over $6,000,000. Bearing these figures in mind, with an annual loss of 10 per cent. from only one insect —the hop borer—(and 25 to 50 per cent. of injury has been reported) a loss of $600,000 would result in this single State.

With such a destructive agent in the hop field, is it not a little singular that there is little or nothing "in the books" on the subject, and that the pest is in all probability an unknown and undescribed species? I am not able to give its name—Prof. Comstock writes me he is working it up—but as I have accumulated a mass of interesting data on the subject in my census work, I deem it proper to make known now the experience of intelligent growers in different sections of the country, for the benefit of those who have not yet learned how to fight the pest, leaving the scientific name and details of habits and natural history to be supplied hereafter.

The only mention that I can find of an insect boring into the crown of the hop plant, in the manner set forth by numerous correspondents, occurs on page 33 of the Report of the Entomological Society of Ontario for 1872, by Rev. C. J. S. Bethune. As an appendix to his paper on Hop Insects, he gives descriptions of an unknown larvæ feeding "upon the crown of the root," and which he was unable to rear. The size of the larvæ and the general points of description agree so well with the unscientific descriptions given by my correspondents, the growers, that I unhesitatingly pronounce them to be the destructive hop borers, which are the subject of this paper.

The pest has been known to cultivators of the hop for many years—indeed it is reported from Oneida County that it has always been known in the locality—and other hop growing districts have felt its presence for longer or shorter periods. In Juneau County, Wisconsin, it was first noticed in 1867, while the observer in Waupaca County had not noticed it prior to 1881. The percentage of destruction varies in different sections from almost nothing—where kept under control, or yards are new—to 25, 50, and even a greater percentage where the yards are old, badly infested, or not looked after. These facts lead a New York grower to state, in his opinion, that it is best to abandon yards after six or eight years' culture, and change to new ground, for "grubs will get

into a yard after two or three years, gradually increase, and in eight or ten years spoil the yard." Other growers contend that only the yards of the ignorant and shiftless are ever damaged to any extent by the borer.

I shall not attempt to give a description of the larva here, further than to say that all correspondents agree in the statement that it is an inch and a quarter to an inch and a half in length, and three-sixteenths to one-fourth inch in diameter at maturity, whitish or light gray in colour with a dark head.

As soon as the vines start from the ground in May and June, and when but a few inches high, the mother insect begins the attack by depositing her eggs upon them. The subsequent injury is thus described by Mr. Pierpont, a large grower of Ontario County:—

"The warm sun hatching the egg deposited in the head of the hop vine, soon after it is out of the ground, it soon becomes a lively worm about one-fourth of an inch in length, subsisting upon the sap of the vine. It leaves the head of the vine soon after hatching, enters the ground, bores to the centre of the vine and works up an inch or two, finally locating where the vine starts from the crown, eating at this point and at the crown until the vine is nearly or quite destroyed, and the crown weakened by water getting in, causing decay, and finally the destruction of the entire hill."

Another report states that the insect begins work in the latter part of June by eating into the tender vines where they start from the old crown or bed root; and unless prevented, will eat the vine entirely off, thus destroying the crop; "many times they poison the root so that the whole hill dies." Old yards die from this cause more than any other, as the borer prevails more in old than in newer ones.

Another grower states that the damage commences about the last of May or first of June, when "the head of the vine will appear slightly bent or curved, if compared with sound ones. The grub, after feeding a little time in the heart of the head drops to the ground and makes its way into the heart of the vine below the surface of the ground, working deeper as it grows larger. The vine wilts and finally dies."

There is great diversity of opinion among growers as to the best means of ridding a yard of these pests. A few take for granted that there is no remedy, leaving skunks to carry on the warfare alone; and right here it may be stated that growers east and west speak most favourably of the friendly offices of this much despised animal in the hop yard. Salt is mentioned by many growers as a remedy. It is put on after the vine has become somewhat toughened, from middle to last of June, salt on the tender new stalks killing them in a short time. Lime, ashes, sulphur, etc., are also recommended, but doubtless do little real good. Some growers emulate the skunks by digging out the grubs, often doing more damage than the pests themselves.

Mr. Pierpont says an experienced tyer of hops can tell at a glance the head containing a worm, which is crushed in an instant, but this process can only be practiced for a few days, as the worms leave the head soon after hatching. Next to the crushing process a useful remedy is to hill the hops as soon as possible and give the yard thorough cultivation. The hilling causes fibrous roots to put out above the operations of the grub and save to some extent the crop.

The most detailed statement of experience, and it seems to me the best remedial agency or means of prevention, is furnished by Mr. J. F. Clark, a grower of Otsego county, New York, who writes as follows:

When the vines are well up the poles, and at the first hoeing about the last of May or first of June, the dirt should be carefully worked away from the vine by the hoe; all the dirt remaining between the vines must be carefully worked out with a sharpened stick, so that all the vines will be left bare as low down as where they leave the bed root; thus they become toughened by the weather, and are not so attractive to the grub. Immediately after this operation, a good handful of the following compost should be applied directly around the root and vine: Take equal parts of salt, quicklime and hen-manure; place the lime on the floor first, and throw on water enough to thoroughly slack it; immediately spread the salt on top, following with the hen-manure. When the lime is well slacked, mix the whole thoroughly, and in a couple of weeks it will be ready for use, as above. Do not hill up the hops until the latter part of July or first of

August, and the yard will not suffer any from grubs, but will remain clean and free from weeds the remainder of the season. When yards are hilled earlier than stated above, the grub sometimes works in them more than in late hilled ones.

To return to the skunks. They seem to have acquired the digging-out process to perfection—far better than the hop grower—as they are able to dig around the hills without the least injury to the vines. In Juneau county, Wisconsin, this little fellow—with an appetite for juicy grubs only equalled in degree by the pungency of his perfume—is the only positive remedy, as he works about the hop-hills or roots, cleaning out the worms in a few nights. One grower says: "I have seen ten acres where not a dozen hills would escape their little noses."

It is worthy of note that in a majority of cases the growers report the borer as the most injurious insect in the hop yard, not excepting the hop-aphis.

THE PICKLED FRUIT FLY—*Drosophila Ampelophila* (Loew).

By G. J. Bowles, Montreal.

In August, 1879, I met with a small Dipterous fly, *Drosophila ampelophila* Loew, in considerable numbers, and as the subject is of interest to entomologists, I give the

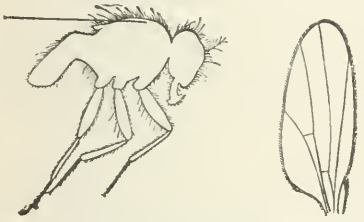
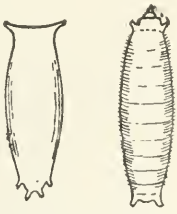


Fig. 12.—*Drosophila ampelophila*: Fly and Wing. Magnified 10 diameters.



b *a*

Fig. 13.—*Drosophila ampelophila*. *a*, Larva; *b*, Pupa. Magnified 7 diameters.

result of my observations. I have to thank Professor Hagen, of Cambridge, for the determination of the species and other information, and also Professor Lintner, of Albany, for a copy of his article in the *Country Gentleman* of 1st January, 1880, on this insect, and from which I have largely drawn.

With regard to the genus, Professor Lintner says: "Twenty-five North American species of *Drosophila* are catalogued, which have all, with the exception of three species common to Europe and America, been described by Dr. Loew, the distinguished Prussian Dipterist, and Mr. Walker, of the British Museum. They have not been studied by our American entomologists, and consequently nothing is known of their habits. I find no reference to a single determined species by any of our writers." In the *American Naturalist*, vol. 2, page 641, an unknown species of *Drosophila* is noticed as infesting apples, preferring the earlier varieties. The larvæ penetrate the interior of the apple in every direction, and if there are several working together, render it quite unfit for use. Dr. Packard, in his *Guide*, page 415, figures an unknown species as the "Apple Fly," which is believed to be the above species. Mr. Walsh, in vol. 2 of the *Practical Entomologist*, also gives a brief notice of a larva supposed to be that of a species of *Drosophila*, and which also was injurious to an apple crop in Vermont to the extent of about half its value, by boring the fruit in every direction.

Professor Lintner further says: "The different species of *Drosophila* vary considerably in their habits, as we learn from European writers; and, indeed, the same species seems often to occur under apparently quite different conditions. The larvæ of the European *D. cellaris* occur in fermented liquids in cellars, as wine, cider, vinegar and beer, and also in decayed potatoes. *D. aceti* Kol. infests decayed fruits. Its larvæ occupy about eight weeks in attaining their growth, and their pupal state lasts for

ten or twelve days. The flies appear in May and June. *D. funebris* has been reared from pupa taken from mushrooms. It is sometimes known as the vinegar fly. Another European species, *D. flava*, is stated by Curtis to mine the leaves of turnips, raising blister-like elevations on their upper surface."

The present species, *D. ampelophila*, is described by Loew in *Centuria Secunda* (Dipt. Amer. Sept. indigena), No. 99, page 101. It is exceedingly common (Professor Hagen states) in the southern parts of Middle Europe and in Southern Africa, but the only localities given for it in America, in Loew and Osten Sacken's Catalogue, are the district of Columbia and Cuba. Professor Lintner, however, has bred it in New York; it also occurs in Pennsylvania, and now Montreal must be added to the list. I also think, from observations made in Quebec, that it, or an allied species, is found there. At any rate, this immense area of distribution for such an insignificant insect is very remarkable.

Like the other species of this genus, and so many other dipterous insects, the larva of *ampelophila* feeds on decaying or fermenting vegetable matter. Professor Lintner bred it from pickled plums; in Pennsylvania it fed on decaying peaches, and I found it in pickled raspberries. An earthenware jar had been nearly filled with this fruit and vinegar, prepared by the good housewife for the purpose of making that favourite drink (in Canada at least) called raspberry vinegar. On opening the jar about ten days afterwards (16th August, 1879) it was found to be swarming with the larvæ and cocoons of the insect. Hundreds of the larvæ were crawling on the sides of the jar and the under side of the cover, while pupæ were found abundantly, singly and in clusters, particularly where the cover touched the top of the jar. The short time required for the production of so many individuals was surprising. I half filled a covered tumbler with the pickled raspberries and larvæ, and they continued to produce flies for several weeks. I regret not having more attentively observed the exact time required for the different stages, and can only say that its growth from the egg must be very rapid, and its pupal state does not last longer than ten or twelve days.

The larvæ (fig. 13 *a*) when full grown, are nearly one-fourth of an inch long, somewhat tapering towards the head, which is small; and are sparsely covered with minute hairs, particularly on the divisions of the segments. They have no feet, but can travel quite rapidly on glass, seeming to retain their hold by a glutinous condition of the skin, and moving by extending and contracting their bodies. They seemed to exist with ease either in the vinegar or the air, moving through the former in search of food, and sometimes coming out of it, and either resting or moving about on the glass sides of the vessel. Their bodies were quite transparent, and under the microscope their internal organs could easily be seen. At both ends of their bodies are curious projections or tubercles, which are also seen in the pupa.

The puparium (fig. 13 *b*) is about three-sixteenths of a inch long, oval in shape, and yellowish-brown in colour, with the tubercles at head and tail before referred to.

The fly (fig. 12) measures about one-eighth of an inch in length, with a large rounded thorax, long legs, and broad iridescent wings. The whole insect is yellowish in colour, and very hairy, even to the proboscis. Some of the hairs on the head bear three or four branches. The wing forms a very beautiful object for the microscope.

Last year the flies were attracted to some raspberry wine in process of fermentation, hovering about the jars and alighting upon the corks, evidently seeking for an opening through which they might pass to lay their eggs. It is doubtless in this way that fruit is attacked by this or some allied species, The minute fly effects an entrance beneath a not closely-fitting lid, and deposits its eggs on the fruit, or upon the side of the jar, whence the young larvæ make they way to the fruit, or find their sustenance in the liquid.

During the past summer I was desirous of again testing the matter. A few raspberries, with a small quantity of vinegar, placed in a pickle bottle with a loose cover, were quite sufficient. A fortnight afterwards a number of larvæ were seen in the bottle, and several pupæ were attached to its sides. Absence from home, however, interfered with the carrying out of the experiment. It could easily be tried this season by some

of our entomologists, and the time required for the transformations of this curious fly be determined, as well as the further extent of its distribution.

The outline drawings were made under the microscope, and give a fair idea of the insect. Every part of the fly is covered with hairs of different lengths, as indicated in the figure. The branched hair on the head is faithfully copied from a specimen, but in others it was not so largely developed. The wings are beautifully edged with hairs, and the membrane is also studded with them. The fly was drawn in the position given, so as to show its extremely long legs, and the curious shape of the thorax and abdomen.

"LONG-STINGS."

By W. Hague Harrington, Ottawa, Ont.

Among the conspicuous insects which attract the attention of even non-entomologists, there are few more interesting in their structure and habits, as well as in their relations to other groups, than the large "long-sting" ichneumons with their long triple "tails." Our two largest species belong to the genus Rhyssa (of the Hymenoptera), and as, so far as I am aware, no accounts of them have yet been published in the Entomologist, a brief description of their appearance and habits may not be undesirable.

They may be easily distinguished from their relatives (often their victims), the "horn-tails"—Uroceridæ—as they are much more slender in body and appendages. The female, readily determined by the extraordinary development of the ovipositor, has the abdomen stouter than that of the male, with the posterior segments dilated and curved under, and bearing the ovipositor, which is constructed essentially of the same parts as is that of a "horn-tail," only that they are greatly lengthened.

The head, in shape like a short segment of a cylinder, slightly convex before and concave behind, bears on its rounded front a pair of large eyes, from between which spring the long slender antennæ. The head is joined by a small neck to the thorax, which is strongly built and supports two pairs of long narrow wings, as well as the six very long and slim, yet strong, legs. The segment of the abdomen which adjoins the thorax is much less in diameter than the succeeding ones.

The male has a long cylindrical abdomen tapering gradually to the extremity. This, in connection with the prominent head and narrow wings, gives him, especially when in flight, a considerable resemblance to a dragon-fly, from which, however, he is at once distinguished by his long antennæ and shorter hinder wings.

In these insects, as in the Uroceridæ, the hinder-wing has upon its anterior margin a row of minute hooks with which to hold the posterior border of the front one. The number of the hooks is, however, much less, there being only about a dozen scattered along the outer half of the wing.

Of our two species the larger and handsomer is *R. atrata*, of which my specimens vary in length from a little over one and one-quarter inches to nearly two. The head is a rich yellow, with the exception of the eyes and a slight band, bearing the ocelli, on the vertex. The slender antennæ, about an inch long, are also yellow, as, likewise, are the extremely long legs, with the exception of the upper joints of the posterior pairs. The thorax and abdomen are black. The wings, which expand from two to two and three-quarter inches, are transparent, but with a dark smoky tinge. The female is furnished with an ovipositor from *four to five and one-half inches in length;* flattened and scarcely stouter than a hair.

R. lunator is more common, at least in this vicinity, and varies much more in size, the largest specimens being fully twice as big as the lesser ones. The body varies in length from three-quarters of an inch to one and one-half inches, and bears at its posterior extremity an ovipositor projecting from one and one-half to three and three-quarter inches.

The head is yellow with a dark band, in which are inserted the three ocelli, between the eyes, parallel to which runs another dark line which almost encircles the head.

Lines also run from the base of the antennæ to the mandibles. The slender antennæ are dark at the base but get lighter toward the tip. The thorax and abdomen are dark brown, ornamented with lines and borders of yellow, which is also the colour of the legs. The wings (front pair) expand from one and one-quarter to two and one-half inches, and have a quadrangular dark patch on the anterior border.

The larvæ of both "long-stings" feed upon those of the Uroceridæ and other wood-borers, in which the female ichneumon deposits her eggs by means of the long ovipositor. The method of performing this operation may often be witnessed during the summer by visiting beech trees in which Tremex larvæ are at work, but it is difficult to describe clearly its accomplishment and the different postures of the insect during the progress of her laborious and dangerous duty. A series of good drawings would best convey a correct idea of the process, but I do not know of any book in which such are to be found, while some illustrations are very inaccurate. For instance, I saw the other day in a text book of zoology an ichneumon depicted with her ovipositor fully inserted in the tree and with the *side-pieces or sheaths sticking straight out behind her*. Such an attitude is altogether unnatural, and I am convinced that in that position she would be powerless to extract the ovipositor.

Selecting a suitable tree, if we find no ichneumons at work, we may shortly see one flying strongly and noisily through the sunny woods and settling upon the bark where perforations mark the exits of previous occupants. Here she runs around until she finds a promising spot, as, for instance, the hole made by a Tremex in depositing her egg. Placing herself so that the tip of her abdomen will be above the orifice to be probed she makes herself as tall as possible, and, by elevating her abdomen and curving under the ovipositor, succeeds in inserting the tip of the latter in the hole.

If the dorsal surface of the abdomen be examined, there will be observed, between the sixth and seventh segments, a gap closed by a whitish membrane. This marks an admirable contrivance to enable the insect to use her seemingly unwieldy weapon, for the membrane is capable of being so dilated as to form a cavity in the posterior part of the abdomen, in which can be coiled a large portion (more than one-third) of the ovipositor, which thus becomes perpendicular under the insect, where it is guided and supported by the sheaths which bend up in loops over her back. By vigourous muscular contractions of the sac, the delicate ovipositor is slowly forced down the larva's burrow, often to its full extent. If a larva be reached an egg is deposited in it, and the ovipositor is slowly withdrawn in a similar manner. This, however, the insect is frequently unable to accomplish, and remains struggling until some bird or tree-toad snaps her up, or she perishes from exhaustion.

I have seen a large *R. atrata* with her ovipositor (five and one quarter inches long) inserted four and one-half inches into a beech, so firmly that it was only by careful and vigourous pulling that I extracted it uninjured.

The insects are to be found during the latter part of the summer; *R. lunator*, as already mentioned, being much the more abundant.

On the last day of June, 1879, while collecting in a grove just beyond Rideau Hall, I stopped to examine a dead tree for bark and fungi beetles, and was bottling a fine *Penthe pimelia*, when the rustling of insect wings above me attracted my attention. Looking up I saw several specimens of *lunator* flying about the trunk, and a circuit of the tree with closer inspection showed many others walking about on the bark or in various stages of the act of ovipositing. The tree was a large one, about two feet in diamter, from which the top had been broken off at a height of thirty or forty feet. The rugged bark was dotted all over with *lunators*, often massed in rows or patches, so that there must have been several hundred upon the tree, forming an unusual and most interesting spectacle. The great majority were females, but a number of males were also present. While I was consigning to my bottle a few specimens, a large woodpecker settled upon the opposite side of the tree and began to rapidly thin the ranks of the helpless insects, whose mission, like that of the woodpecker, is the destruction of wood-boring larvæ.

A year later, being in the same locality, I visited this tree and found again a number of ichneumons engaged in the performance of their duty, and also saw sticking out

of the bark many ovipositors which had belonged to unfortunate visitors of the previous summer.

Field Notes—1881.

The earth covered by its first mantle of snow reminds one that the collecting season is virtually ended, and the lengthening evenings allure one to the study fireside to go carefully over note books and collections and to read the recorded labours of fellow Entomologists.

A few [memoranda from my own note book may perhaps not be barren of interest to some of the less experienced readers of the *Entomologist*. I find that almost the first insect of spring was the Mud-wasp, *Polestes annulatus*, which appeared with a few flies and spiders about the 15th of March. This wasp is very abundant here, and from the pulverized macadam of the streets thousands of its mud cells are constructed every summer under the window-sills and numerous cornices of the Parliament Buildings, about which the wasps linger until the end of October. Toward the end of March a few bees and a number of small beetles, as *Amara interstitialis*, appeared. *Pieris rapæ*, the cabbage butterfly, was observed on April the 1st, but from this date to the 8th of the month a severe cold spell (thermometer touching zero) reduced insect appearances to the minimum again. At its conclusion they emerged in still greater variety and number; *Vanessa antiopa* flitted about in sunny glades of the wood; *Cicindela purpurea* enlivened the fields, and its relatives, *C. vulgaris* and *C. sex-guttata*, the roads. Mosquitoes came in full force a fortnight later, and on the 24th I obtained a number of Buprestidæ upon young pines, viz., 1 ♂ and 2 ♀ *C. virginiensis*, and 14 ♂ and 13 ♀ *C. liberta*. I was somewhat surprised to find them so early in the year, yet could have taken many more. They were generally paired, in several instances copulating. Some *Pissodes* were also seen, and these were with few exceptions copulating. Great numbers of saw-flies were also upon the pines. A few days later I captured specimens of *A. striata*, and by the beginning of May all orders of insects were well represented. On the sixth *Serica sericea* was abundant on the foliage of wild gooseberry bushes. *Chrysomela elegans* were also unusually numerous, but I could not find upon what it fed. *Platycerus quercus ?* was found eating the buds of maples and other trees. The buds were often completely eaten out, and the beetles hidden from view therein. In some buds a male and female were found copulating. This beetle was new to my collection, but I found them frequently again during the summer when using a beating net. During May the curious larvæ of certain Lampyridæ were often seen in damp woods, crawling on the trunks of trees, such as cedar, or affixed by the tail to the bark, undergoing their metamorphoses in a similar manner to the larvæ of the Coccinellidæ. Some reared at home emerged as *Photinus angulatus*. The larvæ, and to a less degree, the pupæ, emitted a strong greenish glow from two of the posterior segments; the imago being, of course, one of our common "fire flies." Some of the larvæ were thickly covered beneath with small ticks, of a bright vermilion colour, which had their pointed heads plunged between the armoured segments of the larvæ. They were not easily dislodged, but walked rapidly when free. By these little parasites the larvæ were so weakened as to perish before completing their transformations. The warm weather of mid-May brought forth increased hosts of insects, and the sultry air, especially in the neighbourhood of lumber yards, swarmed with Scolytidæ, etc. Toward the end of the month I took a trip, with three friends, to the Wakefield Cave, about twenty miles north of the city; and in my spare moments collected a number of insects in that vicinity. Cicindelidæ especially abounded on the sandy hillside roads, and I captured three species which are rare, or not found about here, viz., *C. 12-guttata*, *C. longilabris* and *C. limbalis*. On my way back I took a speciman of *C. sex-guttata* having only two spots (the anterior one on each elytron). Although called Six-spotted Tiger Beetles, very many have eight spots, and specimens with ten spots are frequently taken. In a beech grove at Chelsea, *Ithycerus curculionides* was very abundant; several could be seen on nearly every tree; many pairs were copulating. Where do the larvæ live? On the 31st of May several specimens of *C. Harrisii* were taken on pine saplings, and *H. Pales* and its long-snouted relatives were in full force. On June 4th, *Saperda vestita*, *Oberea amabilis*, *B. nasicus*, *C. nenuphar*, *A. quadrigibbus*, and many

other weevils, elaters, etc., were noted. At an excursion of the Ottawa Feld Naturalists' Club to Montebello (45 miles down the river), on 26th June, I captured 129 species of Coleoptera, a considerable percentage of which were new to me. Carabidæ were particularily abundant under drift-wood and dead leaves on the damp, shady shore, and 35 species were taken. Chrysomelidæ, Elateridæ and Curculionidæ were next in number with 15, 13 and 13 species respectively. After midsummer my opportunities for collecting were few, and my notes correspondingly scanty. I will merely mention the capture at Aylmer and Hull, on Oct. 2, *Aletia argillacea*, the cotton moth; both specimens were in perfect order, not in the least rubbed or worn. In Oct., 1880, I took several specimens about the city, also apparently recently emerged.

ENTOMOLOGICAL NOTES FOR THE SUMMER OF 1881.

By Prof. E. W. Claypole, Yellow Springs, Ohio.

I came only last year on the premises where I am now residing, and though I had a small crop of cherries, they were so badly infested with the weevil *(Conotrachelus nenuphar)* that only a few quarts could be found free from the grub and fit for canning. This year a fair crop was promised, the spring was late and the danger of frost little. I proposed therefore to make war upon the enemy, and as soon as the blossom was over prepared a large sheet of cheese-cloth, and for about three weeks jarred the trees before breakfast almost every morning. As the result, I have now nearly 2,000 weevils peacefully reposing in a bottle, after a composing draught of benzine. Only about 10 per cent of my cherries this year were unfit for use. I carried the war into the orchard, and simply by way of experiment, jarred some of the early apple trees and captured a great many of my enemies. I am more than repaid for my labours both on the cherry and apple trees by the quality of apples, when last year with a larger crop, I only obtained knotty, gnarly fruit. I have this year round, smooth, well shaped apples. I have never heard that anything has been done, at least in this neighbourhood, to trap the weevils on the apple trees. Those who live in the north have no idea of the mischief wrought here by the weevil in the orchards.

A word for the mole. In digging potatoes this year I observed the runs of a mole in all directions through the ground. It was a piece of old sod and very much infested with white worms, the larvæ of the Cockchafer *(Lachnosterna fusca)*. Many of the potatoes had been partly eaten by these worms, but I observed that wherever a mole-run traversed a hill of potatoes no white worm could be found, even though the half-eaten potatoes were proof of his former presence. The inference is fair that the mole had found him first and eaten him, and very likely the mole's object in so thickly tunnelling this piece of ground was to find these grubs.

Now it would be very easy to trump up a charge against the mole on the evidence of these facts. There was the "run" which nothing but a mole could make, and there were the gnawed potatoes; put the two together and kill the mole. Many a man has been punished on less conclusive circumstantial evidence. But it is perfectly easy to distinguish the work of a mole from that of a white worm, if one will only take the pains. I have many times found the latter coiled up in the potato he was eating, but I have never seen the mark of teeth such as the mole possesses on a potato. Nor do I believe the mole ever meddles with potatoes, or corn.

Abundance of Certain Insects.—The Southern Cabbage Butterfly *(P. protodice)* is exceedingly abundant here this summer. I have been able to count scores on the wing at one time.

The potato worm, or larva of *S. 5-maculata*, is troublesome on the late potatoes this month (September) and soon strips a plant of its leaves. However, he is easily dealt with, as he is at once betrayed by the castings on the ground, and a little "poison-dust," such as I use for the beetle, soon makes an end of him. I have tried "Buhach" on this insect, but find the former much easier of application and more effective. The latter

diluted with ten parts of flour had little effect on the worms, but when used neat it stopped their feeding and killed two of them in a couple of days. But there is the trouble of looking up the creature (green on a green ground) in order to put the powder "where it will do the most good," whereas one need only shake the powder-tin over the plant and pass on, leaving the worm to poison itself.

The same is true of the Cabbage Butterfly *(P. rapæ)* in the early stages of growth of the cabbage. I have used Buhach, and a friend of mine is now using it on a plot of 3,000 heads of cabbage, but the time spent in finding the green worm on the green leaf is a serious drawback, and while the plant is very young I prefer using the "poison-dust." I can sprinkle a whole bed while I am finding the worm on a dozen cabbage heads in order "to put salt on his tail." The "poison dust" to which I refer is made by mixing one part of London Purple and sixty parts of ashes and passing the mixture several times through a fine sieve. I may add that I find this a very efficient remedy for the turnip fly.

NOTES ON LAST YEAR'S COLLECTING.

By J. Alston Moffat, Hamilton, Ont.

No one I think can have been long engaged in collecting insects without having noticed the remarkable diversity in the products of different years, not only in quantity, but in kinds. Each summer seems to bring its own particular species to the front, so that if a person wishes to get a moderately correct idea of the insects of any locality, it is necessary for him not only to hunt diligently all the season, but every season for a considerable length of time; and if he has from any cause missed one, he may be sure he has missed something which it may be years before he will again have an opportunity of securing, or securing in the same abundance. The causes of these variations seem as yet to a great extent a mystery.

Insect hunting could not be said to be good in this locality last summer. It might be considered very poor, pet it produced its new things for the collection, and some things in plenty which had hitherto been scarce. On the 12th of May I came across some specimens of a Pieris which I thought were poor specimens of *oleracea*, but which Mr. Edwards determined to be *Virginiensis*. On the 23rd I took a very attractive Chrysomela, which is in the Society's Coll. in London as *C. labyrinthica*, but which the authorities say is *multiguttis* of Crotch's Check List, of which *scalaris* is synonym. Rather remarkable, surely, that so handsome and distinctly marked an insect should not have a name of its own. Its season lasted about four weeks, during which I secured over a dozen. I took one specimen of *Stenosphenus notatus* Oliv. Of this species I captured in May, 1879, three specimens, the first I ever took, and that year, a week or two previous to my captures, I received from Mr. Reinecke, of Buffalo, a pair labelled Dallas, Texas. They are exactly similar. The Cerambycidæ were ten days later than usual this year. *Goes debilis* was numerous, and I took my first and only specimen of *S. pulcher*. *Saperda discoidea*, although never plentiful, is interesting from the great difference in size and the markings of the sexes. I had always found two or three females to one male until last season, when the males were most numerous. There were several species of Leptura quite common, especially *vibex*, which I had not seen before. *Gaurotes cyanipennis* was in great abundance, but although you could bring a dozen down with one stroke, you might not secure more than two or three, they were so quickly on the wing again. The months of July and August were barren of anything worthy of note. In the second week of September the fall moths began to appear, and up to the end of October were quite plentiful. Those attractive genera, Scopelosoma and Lithophane, were more fully represented than I had seen them since the fall of 1877, when I took eight or ten species for the first time. A few *S. Graefiana* and *L. Bethunei* can be found every year, but *Scopelosoma Pettiti* and *ceromatica*, and *Lithophane semiusta*, *pexata*, *signosa*, *petulca*, *querquera*, are rare. Some of these choicer species were easily secured again last fall. I also took one new to me, *L. ferrealis*, whilst a friend here, Mr. J. Johnston, took *S. tristigmata*

and *L. cinerosa*, which we were enabled to identify through the kindness of Mr. R. Thaxter, of Cambridge, Mass. Mr. Kyle, of Dundas, secured *L. Georgii*, which I have not yet met with. It may be worthy of note that Mr. Johnston took a specimen each of *Plusia striatella* and *Chærocampa tersa*, the first taken here of either species.

Mr. Thaxter kindly determined the following for me:

Dryopteris rosea,	Hadena Miselioides,
Limacodes inornata,	Dianthoecia meditata,
Gortyna cerina,	Orthodes cynica,
Calledapteryx dryopterata,	Paristichtis perbellis,
Mamestra eloniplina.	

The last four were taken the previous year at Long Point.

The Development of Attacus Luna.

On the evening of the 12th of April, being at the residence of Mr. J. Johnston, a noise proceeding from his hatching box attracted his attention. Upon looking for the cause, he found a Luna just emerged, the fifth from a batch of nine cocoons which he had raised from the egg. Its body and wings seemed to be quite dry, and were a pure downy white, with the exception of the costal band, which appeared disproportionately large, and a minute dark spot for the eye spot. This beautiful moth is well

Fig. 14.

represented in figure 14. It was remarkably active and did a great deal of rapid travelling before it came to rest, which it did at last quite suddenly on the end of a twig, and then never moved except to better secure its foothold. Mr. Johnston placed it in a suitable position under the full light of the lamp, that we might watch its progress to maturity. The first change noticed was the appearance of a bright green spot near the

base of the front wing, and as that enlarged the wing expanded, very slowly at first, but more rapidly as it increased in size, the green colouring matter flowing along between the upper and lower membrane of the wing, becoming more delicate in its shade as it spread first along the front of the wing, and had reached the apex before it extended through the inner half; but by the time it had touched the extremity of the whole outer angle the size, form and colour of the wing were complete.

In the meantime the hind wing had not yet doubled its original size, with the part from which the tail was to come showing as a slight break on an otherwise even edge; the same routine was followed in the development of the hind wing as that of the front, and by the time the broad part of the wing had attained its full size, the tail was a little more than half an inch long and very much crumpled. This was the last part to expand, but as the fluid passed into it, it also took size and form. The whole time occupied in the operation, from first seeing it until it was completed, was about an hour and three-quarters.

For the benefit of those of our readers who may not be familar with this insect in its earlier stages a larva nearly full grown is shown in figure 15. It is a very handsome caterpillar of a bluish-green colour with a pale yellow stripe along each side of its body, the spaces between the segments traversed by lines of the same colour and each ring adorned with small pearly warts from every one of which arises a small cluster of short hairs.

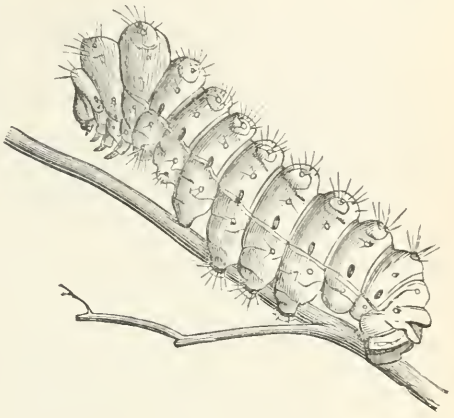


Fig. 15.

Experiments with Yeast in Destroying Insects.

By Dr. H. A. Hagen, Cambridge, Mass.

We are indebted to Dr. H. A. Hagen, of Cambridge, for the following letter and the subsequent remarks on this interesting subject:

Kingsnorth, Ashford, Kent, Dec. 27, 1881.

Dear Sir,—I beg to thank you very much for your letter, dated Nov., 1880, respecting the application of yeast for destroying insect pests. During the past season I have endeavoured to follow the instructions contained therein, and as you express a wish to hear of my success or failure, I will attempt to describe my experiments as clearly as possible. As soon as Aphides became noticeable, I procured some German compressed yeast, dissolved an ounce in a little warm water, added a little coarse sugar, and set it to ferment. In about twenty-four hours I added sufficient water to make up a gallon, and with this syringed a cherry tree attacked by black Aphides. This was on the 16th of June. Four days later I found the tree almost clear of living Aphides, though their dead bodies, or cast skins (I could not ascertain which, although I asked the assistance of an entomological friend) smothered many of the leaves. One remarkable point in this experiment was that a small branch of the tree, loaded with Aphides, hung over a window, and, at the request of my wife, I abstained from syringing it. Here the insects remained perfectly healthy, and after a few days were seen to work down the tree and attack the young shoots that had been washed clean. On June 29th I again dressed the tree, and this time destroyed or drove away every Aphide. I may add that the larvæ of several Aphidivorous insects were present on the tree, and did not appear greatly affected by the application. Encouraged by the apparent success attending the application, I commenced operations, June 20, on a second cherry tree. This, however, was heavily leafed, and I could not make so much impression, but they evidently did not like

the dressing, for they disappeared entirely soon after the second application. I also tried the yeast for Aphides on Guelder Rose (Viburnum), Elder (Sambucus), Field Bean, and some other plants; also for Currant Grub, but could make no decided mark anywhere. With respect to the Currant and Gooseberry Grubs, the liquid ran from off their bodies clean, and I found it almost impossible to saturate them with it. If the syringing was persisted in, they would release their hold and fall to the ground, but very shortly crawl up again. To conclude, I was delighted with the apparent success of my first experiment, but all subsequent trials were so discouraging that I fear yeast is too uncertain in its action to supersede many of the washes we have already in use. Again thanking you for your kind letter, I beg to subscribe myself, sir, Yours most respectfully,

THOS. H. HART.

To Dr. H. A. Hagen, Cambridge, Mass., U. S. A.

This interesting letter by Mr. Thos. H. Hart, who owns nurseries and greenhouses, allows the following conclusions:

I. It is doubtless true that in the experiments of June 16 and 20, the Aphides were killed, as upon the branch not syringed they remained in perfect health.

II. It is doubtless true that the later experiments were a failure.

III. It seems evident that the yeast has not contained Isaria, or other fungi obnoxious to insects, to which the first success could be ascribed; otherwise the later application of the same fluid ought to have had the same effect, or even by the multiplication of the fungi, a more marked effect.

Experiments made in Germany and here had exactly the same result, first success, later failure. In Germany it was made on a jasmine, in a flower pot, and the previously rather sick plant was in 1881 in good health and perfectly free of Aphides. Some currant shrubs on the left side of my house were entirely free through the whole year (without fall generation) after the experiment, though similar shrubs on the right side of my house were badly infested with currant worms; I had here purposely not applied yeast. After all I believe it can be concluded that a *certain stage* of the yeast solution is needed to make it effective, and that after this stage it becomes indifferent. That yeast solution has killed insects seems to be undoubtedly proved, and it remains only to find out the stage in which its application is successful. It is sure that success, even in a small number of experiments, cannot be annihilated by failure in other experiments.

THE CABBAGE BUTTERFLY, *Pieris Rapæ*, IN NEBRASKA.

By G. M. DODGE, GLENCOE, DODGE CO., NEB.

I am sorry to note the appearance of *P. rapæ* in Nebraska. August 3rd, 1881, I first saw a living specimen; needless to add that it was busily engaged in a cabbage patch. Others soon appeared, and before cold weather set in it had become quite abundant and larvæ in an advanced stage of growth were found in November. Probably the butterfly crossed the Missouri in the summer of 1880. We are here thirty-five miles west of the river, a distance that could hardly be traversed in one season. It also appears that the cabbage crop has been almost totally destroyed in the eastern part of Dodge County and farther east, while here a partial crop has been secured notwithstanding the visit of the imported pest, supplemented by an unusual abundance of the Cabbage Plusia. August 1st, 1873, when I left my former home in Bureau County, Illinois, *rapæ* had not yet reached that place; therefore in less than eight years its westward progress upon this parallel has taken it across the State of Iowa and the Mississippi and Missouri Rivers.

The question naturally arises—Will the insect stop short when he reaches the grassy plains of Western Nebraska, or will it press onward to the cabbage gardens of Utah and the Western slope? By the aid of man it might soon cross the plains, even if it subsisted wholly upon cabbages; but being not averse to other cruciferous plants, it will find its way made easy. A mustard-like plant of this family with pink flowers grows along the embankment of the Union Pacific Railway, nearly if not quite through-

out the whole distance from Omaha to Ogden. At Ogden Junction it is the most abundant of wild plants. If this plant furnishes a suitable food, *P. rapæ* will have little difficulty in surmounting all obstacles that bar its progress toward the valley of the Salt Lake.

LEAF-MINING ANTHOMYIDÆ.

By J. A. Lintner, Albany, N. Y.

Among our American species of Anthomyidæ, none have hitherto been known as leaf-miners. Several are depredators on the roots of garden vegetables, as indicated by the specific names of *Anthomyia ceparum*, *A. brassicæ* and *A. raphani* (the onion fly, cabbage fly and radish fly); some occur in excrementa, and one, a few years ago, was discovered as preying upon the eggs of the Rocky Mountain locust. During last year and the preceding a species *(A. betæ)* which had been almost unknown since its publication in 1860, has been seriously damaging the leaves of beets in England, by mining them in tortuous channels and large blotches, causing them to shrivel, dry up and die. In two counties alone, 1,624 acres of mangolds were infested (Ormerod). This last summer some Anthomyiæ larvæ were discovered by me in Middleburgh, N. Y., extensively mining the leaves of the garden beet *(Beta vulgaris)*. Judging from published descriptions and figures, I believed it to be identical with the European species of the same habits, and that it had been a recent importation thence. Examples of the eggs, larvæ, puparia and flies were sent by me to Mr. R. H. Meade, of Bradford, England, who has been recently making special study of the Anthomians, and particularly of the North American species, as may be seen in a paper in the March number of the last volume (xiii) of the Canadian Entomologist, giving the result of his study of the collections in this family, belonging to the Museum of Comparative Zoology at Cambridge, Mass. Mr. Meade finds, among the examples which I sent to him, reared by me from my larval collections at Middleburgh, no less than three distinct species—all differing from *A. betæ* —two believed to be undescribed—and one identified as *Chortophila floccosa* Macq. It seems somewhat remarkable that all these should have been obtained from larvæ feeding at the same time, upon a small garden bed of beets, containing about fifty square feet of surface. The description and general history of the new species will probably be given in my forthcoming Annual Report.

MIGRATION OF DRAGON-FLIES—*Aeschna heros** (Fabr).

By A. H. Mundt, Fairbury, Livingston Co., Ill.

On the evening of August 13th, 1881, I observed them between the hours of five and seven o'clock. The air for miles around seemed literally alive with these dragonflies, from a foot above ground to as far as the eye could reach, all flying in the same direction, a south-westerly course, and the few that would occasionally cross the track of the majority could all the more easily be noticed from the very regular and swift course they generally pursued; but even these few stray ones would soon fall in with the rest again. Very few were seen alighting, and all carefully avoided any movable obstacles.

The next day very few were seen on the prairies, and these mostly of another species very abundant in this country—*Anax junius* (Drury)—which were probably at home previously, and in a few days I could see none others but the latter. A few newspapers, and also a few correspondents from twelve to fifteen miles east and west of here, had observed and mentioned their flight. Although their course was precisely in

* { *Œschina heros*, Fabr.
{ *Æschna.*

that direction, Prof. Forbes, of the State Normal Museum, writes that "no observations had been made there regarding the migrating of this insect," and he kindly identified the last-named species for me; however both have been carefully looked up and identified as being separate, by other well informed Entomologists, all agreeing with me that the above names are correct.

Whether their migrating was instinctive, or forced by the Manitoba wave, then reported in Chicago papers as having arrived in that direction, after a spell of very warm weather; or caused by the dry season, the ponds having become so exhausted as to afford no pasturage for their larvæ, seems a matter of conjecture; most likely the latter, however, as the cold wave reached here but very slightly.

BOOK NOTICES.

The Hessian Fly, its ravages, habits, enemies and means of preventing its increase, by A. S. Packard, jr., M.D.; being Bulletin No. 4 of the Department of the Interior, U. S. Entomological Commission, 8vo., pp. 43, illustrated by two plates containing many figures, one wood-cut and a map.

A synopsis of all that has been published in reference to this destructive insect, with such additional facts as the members of the Commission have been able to collect.

A Treatise on the Insects Injurious to Fruit and Fruit Trees in California. By Matthew Cooke, Chief Executive Horticultural Officer; 8vo., pp. 72.

This useful pamphlet treats of the Codlin Moth, which has now taken up its permanent residence in California, making apple and pear growing in some sections very uncertain; the Pear Slug, the Red Spider, the Tent Caterpillar, Currant Borer, and several species of Scale Insects which attack the apple, pear, peach, plum, orange, etc., illustrated by a number of wood-cuts. It appears that our California friends are now seriously affected by insect pests, from most of which they had until of late been free. The fruit interests of this State are so highly important that very active measures are being taken to keep these insect pests within bounds, and an Act has been passed by the State compelling the general adoption of such remedial measures as shall from time to time be found of value. We shall watch with interest the effect of such legislation, and sincerely hope that it may result in a marked abatement of the evils complained of.

Bulletin No. 7 Insects Injurious to Forest and Shade Trees. By A. S. Packard, jr., M.D. Issued by the Department of the Interior, U. S. Entomological Commission; 8vo., pp. 275, with 100 illustrations.

The object of this Bulletin, as stated in the introduction to it, is to give to the public a brief summary of what is up to this time known of the habits and appearance of such insects as are injurious to the more useful kinds of trees. Beginning with the insects injurious to the various species of Oak, the author treats of those which injure the Elm, Hickory, Butternut, Chestnut, Locust, Maple, Poplar, Linden, Birch, Beech, Tulip Tree, Horse Chestnut, Wild Cherry, Ash, Alder, Willow, Pine, Spruce, Balsam, Juniper, Tamarack, Arbor Vitæ, and others. A large proportion of the work is occupied with descriptions of those insects which injure the more important forest trees such as the Pine and Oak. This is a most useful synopsis of our knowledge in this department, and its issue will no doubt greatly stimulate the progress of Entomology in this practical direction, for while it shows that much has been done in some of the most important departments, in many others our knowledge is extremely scanty. This work is conveniently arranged, and like the other works of this distin-

guished author, well written in a plain and popular style, and will commend itself to all who are interested in preserving our forests and useful shade trees from destruction by insect foes.

(A Fragment of a) Guide to Practical Work in Elementary Entomology. An outline for the use of students in the Entomological Laboratory of Cornell University, by J. Henry Comstock; 8vo., pp. 35.

This work is divided into two chapters, the first of which treats of the terms denoting the position and direction of parts in insects, the second of the external anatomy of a grasshopper, *Caloptenus femur-rubrum*. A useful guide to all those entering on the study of Entomology.

Tenth Report of the State Entomologist of the Noxious and Beneficial Insects of the State of Illinois. By Cyrus Thomas, Ph. D.; 8vo., pp. 244, illustrated with two plates and 79 wood cuts; containing articles on the army worm, *Leucania unipuncta;* a new Corn Insect, *Diabrotica longicornis;* the Relation of Meteorological Conditions to Insect Development; Descriptive Catalogue of Larvæ; the Larvæ of Butterflies and moths; and the Hessian Fly.

This Report contains much that is new in reference to these several subjects, and is a valuable contribution to Entomological literature.

A Bibliography of Fossil Insects. By Samuel H Scudder, 8vo., pp. 47.

A complete list up to the present time of all known works and papers on fossil insects arranged in alphabetical order.

Synopsis of the Catocalæ of Illinois. By G. H. French, Carbondale, Ill.

Contains references to fifty-eight species, followed by instructions for capturing Catocalæ, 8vo., pp. 11, with one wood-cut.

Revised Check List of North American Birds, with a Dictionary of the Etymology, Orthography, and Orthoepy of the Scientific Names. By Dr. Elliot Coues; lge. 8vo. Estes & Lauriat, Boston.

Such a book from such a pen cannot fail to come into the hands of a great many Ornithologists, and the circulation of so valuable a work will greatly tend to render this much neglected part of the science more widely studied and understood. The first part of the book is devoted to notes and general explanations on Etymology, Orthography and Orthoepy. The second part contains the Revised Check List proper, and on the latter part of each page the names divided into syllables and marked for pronunciation and accentuation, with copious notes on the derivation. In regard to the nomenclature, the author has in many instances in this work taken a stand opposed to that of some eminent Ornithologists of the present day, which is much to be regretted in view of the desirability of uniformity in this matter. The printing is excellent, and done on fine heavy paper, and the proofs have evidently been most carefully read, altogether forming a very attractive volume and a valuable addition to the Ornithologist's library.

ON LUMINOUS INSECTS.*

By Geo. H. Bowles, Montreal.

Scattered here and there throughout the Organic world we find certain species possessing the remarkable power of giving light—not the light generally associated with the phenomena of combustion, but usually a mild phosphoric glowing or sometimes a succession of brilliant coloured flashes.

One of the most familiar instances of luminosity, is that which is due to the mycelium of fungus pervading decaying substances such as wood, peat or fermenting leaves.

The light is often seen at night in damp places in the woods and by the side of lanes. It usually proceeds from old roots or stumps, the substance of which, during the day, presents a whitish yellow appearance, but at night, throws forth a mellow, ghostly light, quite startling when first seen.

Besides the humble fungi, several plants in the higher groups are said to be luminous. The daughter of Linnæus in 1762 noticed radiations of light proceeding from a cluster of garden Nasturtiums (Tropælum Majus). This appearance has also been observed in the Marigold, Poppy, and other plants as well as in certain mosses.

In the lower orders of the animal kingdom, luminosity is not uncommon. That beautiful phenomenon, a phosphoresent sea, is generally ascribed to the presence in the water of innumerable multitudes of microscopic beings termed *Rhizopoda.*† As we rise higher in the scale numbers of creatures are found endowed with this remarkable property,‡ and when the class *Insecta* is reached, we see species provided with a luminous preparation, which fully equals in proportion to size, the light given by our common modes of over-coming darkness.

It would be hardly right to overlook the Centipedes, though not true insects, as one species at least is capable of diffusing a very strong light. This species, *Scolopendra electrica*, is found in England, and is by no means uncommon. Though its light is seldom seen, in consequence of its living in holes, or under clods of earth. The light proceeds from the whole body, not being restricted to certain parts as in insects. Other species of this genus are said to be luminous. One described by Linnæus S. phosphora is a native of Asia.

Among the true insects the most familiar examples are our common Fire-flies, belonging to the family *Lampyridæ Leach.* These little creatures may be seen in great numbers on warm summer evenings, especially in marshy places. The perfect beetle is soft and flat, with a horny, semi-transparent shield projecting over the head. The light-producing organs are situated in the three last segments of the abdomen, and are of a light sulphur colour. Patches of this colour also extend on either side of the head beneath the over-hanging Thorax. When the insect is taken in the hand a constant gleam of light proceeds from the abdominal glands, whether it comes from the head too is questionable.

When on the wing the light is intermittent, flashing for a second and then being extinguished, appearing again shortly in another place as the insect flies.

The genus *Photinus* includes the greater number of our luminous species. The females are provided with wings unlike certain foreign *Lampyridæ*, and both sexes equally possess the power of giving light.

Phosphorescence has been noticed in the larvæ of several American Fire-flies. Specimens of *Photuris pennsylvanicus (DeGeer)* have been found to emit a brilliant light from their anal segments,§ and it is not unlikely that many, if not all, of those that

* A late article in the English *Mechanic* Vol. XXX, p 559, states that a fungus *(Agaricus Pleurotius emerici u. e.)* has been found in the Andaman Islands, the entire substance of which is luminous. The specimens were quite young and scarcely fully developed.

† One in particular, *Noctiluca Miliaris.*

‡ *Polypes, echinoderms, medusæ, &c.* Even the common earth worms are said to evolve a shining light.

§ *Canadian Entomologist*, Vol. I, p. 39, and Vol. II, p. 38.

possess the property in their perfect state have it, though, perhaps, in a less degree in their early stages.

The light-giving *Lampyridæ* are represented in Great Britain by the common English glow-worm *Lampyris Noctiluca*. This species has so often been described that its general characteristics are well known to every one. It is common in the south of England, but is rare in the northern parts, and Scotland. The perfect insect is herbivorous, feeding only upon the tender leaves of plants; but in the larval state they are voracious in their habits, devouring snails, slugs and soft-bodied insects.

It is slightly luminous in its preparatory stages. But the perfect female alone can be said to possess the property to any extent. Indeed it was formerly supposed to be peculiar to this sex, but the male has now been ascertained to give a feeble light.

Lampyris Italica,* though truly a continental species, is taken occasionally in England, both sexes being luminous.

Another *Coleopterous* family, the *Elateridæ*, contains species endowed with the property of light emitting in a much greater degree than *Lampyris*. The members of the genus *Pyrophorus* are natives of the South, and like all "Click-beetles," are dull sombre-looking creatures, of moderate size.

Pyrophorus noctilucus is a dark, rusty, brown beetle, about an inch and a half long. A native of the West Indies and Central America. Figure 16 represents this interesting insect both at rest and on the wing. The light chiefly proceeds from the transparent,

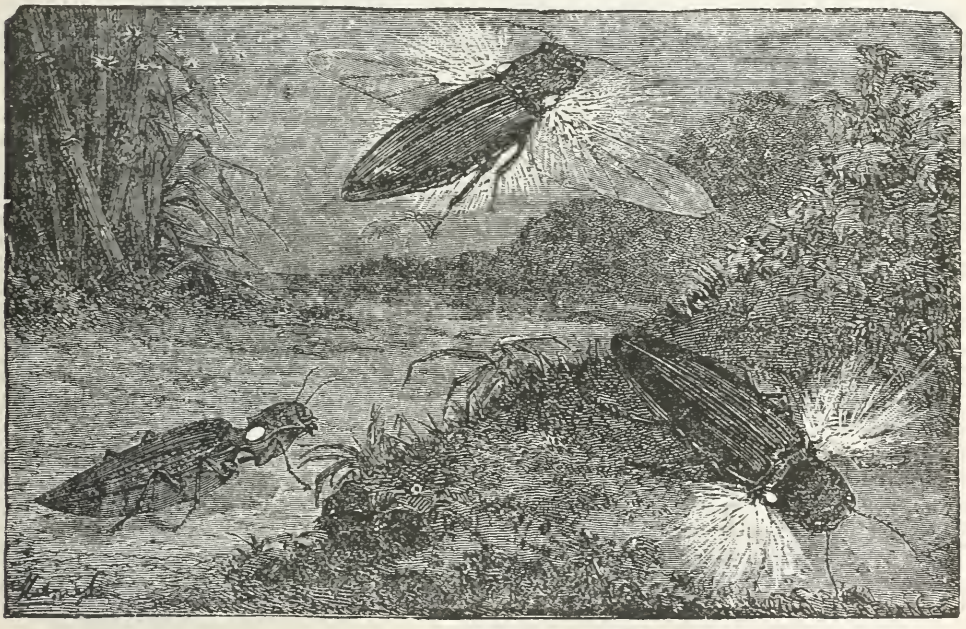


Fig. 16.

eye-like spots on either side of the thorax. A fainter light is also said to come when the insect is flying from two patches beneath the body, but according to Kirby and Spence this is incorrect. They say: "There is a luminous patch in the posterior and inferior region of the metathorax, in a somewhat triangular and depressed cavity, ordinarily concealed by the elytra, but when these are expanded in the act of flying, giving out a more considerable, but more diffused, light than the thoracic reservoirs; in fact, the whole body is full of light, which shines out between the abdominal segments when stretched, and being strongly reflected by the two basal abdominal segments, gives an

* General Zoology, Shaw, 1806, Vol. VI., part I, p. 77-78.

appearance of the two luminous patches there, which DeGeer has described, but which do not actually exist.*

These elaters, we are told, are used by the natives of the tropic countries where they are found, as lamps, enabling them to perform their evening household duties by their light, as well as for purposes of decoration. Brazilian ladies, at the present day, fasten them in their hair as ornaments.

Many other luminous elaters are found all the way from the Southern States to Chili; but of their occurrence in the perfect state as far north as this, I have not been able to find any record—though in the early numbers of our journal, the *Entomologist*,† mention is made of the capture in Ontario of a luminous larvæ supposed to belong to the *genus Melonactes*. Unfortunately it was not reared to the imago, and the species to which it belonged is therefore in doubt.

Several other species of *Coleoptera* are thought to be luminous. *Buprestis ocellata*, is described as emitting light from the ocelli in its elytra; and one of the Longicorn beetles (*Dadoychus flavocinctus*) allied to *Saperda*, is supposed to have phosphorescent organs in the third and fourth segments of its abdomen.‡

Besides the *Coleoptera*, another insect order is said to contain luminous species. I mean the order *Hemiptera*. To one of its families, *Fulgoridæ Leach*, belong two insects that are stated to be in possession of luminous properties far exceeding those of the insects before described.

The best known of these insects, *Fulgora lanternaria*, was first described by Madame Merian in her work on the "Insects of Surinam." She states positively that she herself saw numbers of these lantern-flies§ shining at night with great brilliancy, and that the light proceeding from one of them was sufficient to easily read a newspaper by.

The accuracy of this statement has been questioned by many writers. An experienced Entomologist, who resided for a number of years in Surinam, denies that the insect gives any light whatever, while some of the residents declare that it does,‖ and others again that it does not. Kirby and Spence think that "these contradictory statements may be reconciled by supposing that one of the sexes is luminous and the other is not." ¶

It is not unlikely that the luminosity may be merely occasional, perhaps being limited to particular seasons or the time of pairing. At any rate the subject requires further investigation before a decisive verdict can be given either way.

The other species is a native of China, and is called the candle-fly (*Fulgora candelaria*). Of its luminosity there is still greater doubt than of that of the American species. By some it is supposed to be the insect collected by a species of "*ploceus* or weaver bird to decorate its nest, to which they are attached by means of clay, whether for the purpose of food or light remains to be proved." **

Other insects, besides those already enumerated, have been stated by various writers to be luminous. Kirby and Spence mention the case of a country-man pursuing a "Jack o' lantern," which being captured turned out to be a mole-cricket (*Gryllotalpa vulgaris, Latr.*),†† and in another instance a farmer describes a luminous object which he knocked down as being exactly like a "Maggy long-legs" (*Tipula Oleraceæ*).‡‡

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* Kirby and Spence—"Introduction to Entomology," London Ed., p. 540.

† *Canadian Entomologist*, vol. 1, p. 2 (a full description is given). Also see Annual Report of Entomological Society of Ontario for 1872, p. 74. A luminous larvæ is mentioned by Baron Osten Sacken as being taken at West Point, N.Y.—described and figured Proceedings Entomological Society, Philadelphia, 1862, p. 125, Pl. 1, fig. 8.

‡ Kirby and Spence—p. 542.

§ *F. lanternaria* is called by the Dutch "scare-sleep," from the noise it makes towards evening. It is also called "porte-lanterne," or "lantern-bearer."

‖ It affords "sufficient light for almost any purpose"—See "Narrative of a Five Years' Expedition Against the Revolted Negroes of Surinam," Capt. J. G. Stedman, vol. 2, p. 37.

¶ Kirby and Spence—p. 543.

** "Nat. His. of Insects." New York: Harper Bros., 1840—p. 130.

†† Kirby and Spence—p. 544. ‡‡ *Ibid.*—p. 546.

This would lead us to suppose that other common and well-known insects may be found to possess the property on investigation.

Kirby and Spence suggest that in some cases phosphorescence may be caused by disease, they also think that light giving insects may in part explain the mysterious phenomena of *ignus fatui*.

With regard to the use of the light to its possessor opinions are divergent. In the case of the *Elateridæ*, one theory is that it may serve to defend them from their enemies by alarming them,* and this may not be far from the truth, as an animal would require a great deal of pluck to swallow one of these specks of living flame.

Its purpose in the lantern-flies it would be rash to conjecture until the fact of their luminosity is fully proven.

Even of its use in the *Lampyridæ* little is known. The most satisfactory explanation, more particularly applicable to *Noctiluca*, is that it serves to direct the male insect to the abode of its wingless mate.

But with our American species this explanation hardly holds good, as both sexes can fly, besides being equally luminous.

I have seen it stated† that the *Lampyridæ* are distasteful to many insectivora. May not the light then serve as the brilliant colours of some caterpillars are supposed to do, as a warning of their offensiveness to creatures that would devour them? thus deterring the insect eater from swallowing an unpalatable morsel, and at the same time protecting these soft-winged beetles better than the shelly armour of most other members of their order.

The light in the *Lampyridæ* and *Elateridæ* has been ascertained to proceed from a soft, yellow substance, thickly permeated with air tubes, which is closely applied to the transparent parts of the body through which it is seen.

In the glow-worm, besides this substance, there are two small oval sacs, formed of a fibre wound spirally, as in the tracheæ, which contain a yellowish matter capable of affording a more powerful and permanent light than that of the adjoining parts.

Until lately the cause of insect luminosity was supposed to be the combination of some phosphoric matter in combination with the oxygen inspired by the animal. But latterly investigators have ascribed it to physical rather than chemical action, and it is now thought to be explained by the vibratory or undulatory theory of light. Rapid molecular vibrations, set up by the action of light-waves in the particles of a phosphorescent body, are supposed to be communicated to the theoretical ether which is thought to fill all space. The principle being that these vibrations produce light as the vibrations of air generate sound.

To enter more fully into this question is not in the scope of the present paper, nor is it, strictly speaking, in the domain of the Entomologist, still the subject is one that may profitably occupy our leisure moments during the coming summer, and those of our members who possess powerful microscopes may do good service by examining the phosphorescent organs of insects and giving us the result of their investigations. The field is almost unexplored, and as yet we have to confess our ignorance of the causes which produce many of the phenomena that I have but touched upon.

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* Kirby and Spence—p. 549.

† I think by Mr. A. R. Wallace, in *The Contemporary Review*.

HOUSE-FLIES.

W. Hague Harrington, Ottawa.

It will be necessary to define what a fly is, for the name is very commonly applied to many insects which belong to very different orders. We have, for instance, saw-flies, butter-flies, fire-flies, dragon-flies, and shad-flies, belonging respectively to the *Hymenoptera*, *Lepidoptera*, *Coleoptera*, *Neuroptera*. All of these have four wings, in common with the majority of insects; whereas the true flies have only two and constitute the order of *Diptera*, which name is formed from the Greek words *dis*, twice, and *pteron*, a wing. Although the order is not generally a favourite one with Entomologists, its study will reveal a great many curious and important facts in connection with insect life. Its members are not so handsome nor as large as those of the *Lepidoptera* and *Coleoptera*, nor do they construct complex dwellings like the *Hymenoptera*, yet their larvæ are found living under the most varied and wonderful conditions, and not unfrequently greatly affecting man's welfare, as do often also the perfect insects.

All insects (by the classification used in this country) are divided into seven orders according to the character of the wings, and these orders are again arranged in two series—one having mouth-parts adapted for biting and masticating their food, the second having the analogous parts modified to form a sucking apparatus. The *Diptera* belong to the latter.

It has been estimated that there are about 10,000 species of flies indigenous to North America, of which not more than one-fourth have been described, so that plenty of material yet remains for investigation, and doubtless many new species would reward an industrious collector in any section of Canada.

No other insects, perhaps, occur in such profusion as do flies. As soon as the first mild days arrive, clouds of small gnat-like forms appear, and as the season progresses new species are continually emerging. At times the air seems literally full of these minute beings, which swarm alike in woods or over fields and waters, very frequently making their presence felt as well as seen.

In the larval state they occupy a very important place in the economy of nature, and while some species—such as the hessian-fly and wheat-midge—are most inimical to man's interests, the majority subsist by destroying substances which otherwise might remain to infect and contaminate the air. The aquatic species—such as the black-flies —live principally on decaying vegetable or animal matter in the water, while the greater number of terrestial forms subsist upon similar substances, which they rapidly consume.

So rapidly does this consumption proceed that Linnæus, referring to the flesh-flies, stated that three of them with their progeny could eat up a dead horse as quickly as a lion could.

Notwithstanding that house-flies abound everywhere, or at least where man has his habitation, comparatively few persons know the most simple facts concerning their life-history and transformations. Even among Entomologists there is much of vagueness in regard to these matters, owing partly to few having fully investigated the habits of the house-fly, and partly to its being often confounded with allied species. There appeared last year, in a popular magazine, an article taken from "Science Gossip," and professing to treat of the development of *Musca domestica*—as the house-fly is named by Entomologists—in which it was stated that the larvæ were reared in meat upon which the fly had deposited its eggs. This shows at once that the description was really that of the development of one of the meat-flies; for, so far as I am aware, the house-fly has never been known to deposit its eggs upon meat.

The house-fly of this country is now known to be identical with that of Europe, although the late Dr. Harris described it under the name of *Musca harpyia*. Even in Europe but little attention has been given to its habits since its name was bestowed upon it by Linnæus.

Packard, writing in 1873, stated that there were only three works in which its life-history was given. The first was published by DeGeer, in 1776, and satisfactorily described the various stages, but did not give the time occupied by each. The following is his description of the manner in which he discovered the habitat of the larvæ:—

"In considering the enormous abundance of these domestic flies, which especially appear in the months of July and August, it is astonishing that no person has hitherto discovered their larvæ. I searched uselessly for them myself everywhere during several years, and then it was only chance that caused me to discover them in the same months of July and August of the year 1750, when having, according to the instructions M. de Reamur in the 'Art of Hatching Domestic Birds,' made one day a heap of horse manure to hatch some chickens, I saw flying upon and all around it a great number of these flies, which having aroused in me the curiosity to stir up the heap, I found in it abundance of larvæ with the head of a variable form; and having enclosed several of them in a sand-box half filled from this same dung-heap, I observed that some days after they had made cocoons of their own skin, from which came out afterwards true domestic flies, such as those which I have just described. The larvæ of this species live then in manure, but only in that which is very warm and moist, or to say it better, that which is in a complete fermentation, as was that which immediately surrounded the cask in which I hatched successfully some hen's eggs; at least I have never met with them in dry manure nor in the earth."

The second work was published several years later by a German named Keller, and contained excellent figures of the larvæ and pupæ. The third, also by a German named Bonché, appeared in 1834, but the figures in it (copied in the "Guide to the Study of Insects") were drawn so poorly as to be unrecognizable. Packard, not having seen Keller's work, was of impression that the poor figures of Bonché were the only ones published, but I have before me a little book, entitled the "Earthworm and House-fly" (published in 1858 by James Samuelson, assisted by J. Braxton Hicks, M.D., F.L.S., etc.), which reproduces Keller's figures from a copy of his work in the British Museum, and shows us that they were excellent ones. There are also some very fine microscopic illustrations of various parts and organs of the house-fly in the little treatise just mentioned drawn by the author.

As recently as 1873 the transformations of the house-fly had not been given by any American naturalist; but in the autumn of that year Packard worked out its life-history, and described its different stages in a paper published in the Proceedings of the Boston Society of Natural History. This paper was accompanied by a large plate of excellent figures, and to it I am indebted for many of my facts.

Every one has noticed that flies are particularly numerous in the vicinity of stables, and investigations have proved that it is in the decomposing vegetable matters which there accumulate that the eggs of the fly are deposited and that the larvæ live. Keller reared them successfully in a jar of moist decomposing wheat, but the material used by Packard was that which furnishes the majority of flies with a breeding place, viz., fresh horse manure. In the crevices of this substance the fly deposits her eggs to the number of about 120. These eggs are elongate, oval cylindrical; a little smaller and more pointed at the anterior than at the posterior end. Each is from $\frac{1}{100}$ to $\frac{3}{100}$ of an inch long and $\frac{1}{100}$ of an inch in diameter, being slightly smaller than the egg of the meat-fly which we see attached to meat. In colour it is a chalky white, and opaque, so that the earlier embryonic changes cannot be observed, as in the case of many insects having transparent eggs. With suitable conditions of heat and moisture the egg hatches in 24 hours, and there slips out an active, semi-transparent little maggot (as the larvæ of all flies are called) $\frac{7}{100}$ of an inch in length. About 24 hours later the larva, grown too big for his jacket, casts it aside, and now measures from $\frac{15}{100}$ to $\frac{17}{100}$ of an inch, and is slenderer than during the preceding stage. This second stage lasts from 24 to 36 hours, when another moult takes place, after which the larva lives three or four days and attains a length of from $\frac{1}{4}$ to $\frac{4}{10}$ of an inch. The larva has a small conical head, bearing minute, two-jointed antennæ, and below them three small fleshy tubercles—probably representing or foreshadowing some of the future mouth-parts, of which there

are now only a pair of black, horny mandibles. The segment immediately behind the head, known as the prothoracic segment, bears a spiracle, or breathing orifice, and others are situated in the anal, or posterior segment.

When the larva is full grown its body contracts and changes in shape, becoming what is known as a *puparium*. That is, the larva does not spin a cocoon in which to pupate, but uses for this purpose its own skin, which becomes detached and hardened, and within which the pupa forms and remains for from 5 to 7 days. This puparium is of the shape of a grain of rice, from $\frac{1}{5}$ to $\frac{1}{4}$ of an inch long, and of a dark reddish-brown colour.

At the end of the time just mentioned the insect frees itself from the pupa-skin and pushes its way out of its case, the anterior end of which splits off at the junction of the thorax and abdomen, and falls back like the lid of a box. On emerging from his band-box the fly, however, not yet ready to set out on his tour of visits and explorations; his clothes do not fit him comfortably, nor is he yet the trim, natty little chap that we are familiar with. His wings are soft, small and baggy, barely reaching to his waist, and pressed against his sides. He is also pale, indeed nearly white, with perhaps a slightly jaundiced appearance, due to his underground life and recent close confinement in a dark cell. But he walks or runs rapidly about, respiring quickly and strongly, and in an hour or so his wings expand and stiffen, the proper colours develope, and blithe and agile he leaves his lowly birth-place in search of adventures.

Before describing the fly in this final and perfect state, I will recapitulate its life-history as already given.

The eggs laid are about 120 in number, and in about twenty-four hours the larvæ are hatched. There are three stages of the larval state, and consequently two moults. The first stage lasts about one day. The second stage lasts about one day. The third stage lasts three or four days. The entire larval state lasts from five to seven days. The pupal state lasts from five to seven days. The period from the time of hatching to the exclusion of the fly lasts from ten to fourteen days in warm weather.—(*Packard*).

We thus see that from the time the egg is deposited until the fly arrives at maturity only about a fortnight elapses; and when we consider that the fly, unlike many insects, does not die immediately after depositing her eggs, but survives to perform that operation, perhaps, twice or thrice again, it will not be difficult to account for the rapid manner in which the swarms increase toward the autumn. It was calculated by Keller that if a fly deposited eighty eggs, and that only half of these produced females, she might in one season be the progenitrix of upwards of *two millions*. Other authors have arrived at a much larger number as the possible offspring in one season, but the smaller one will suffice to show how rapidly they are capable of increasing.

Although the common house-fly is so abundant, it so closely resembles allied species that it is very difficult to distinguish it from some of them. The structural differences by which entomologists recognize it are those of the mouth-parts, and venation of the wings.

The following is its description as taken from Packard:—

"The body of *M. domestica* is black; the head has a longitudinal, reddish, oval, smooth area on the vertex, with the orbits and adjacent regions golden (or silvery in some lights); the hairs are black, and the antennæ and plume are black; the thorax is black, tinged with golden grey on the sides, with three dorsal, grey, longitudinal bands, the middle one most distinct, the two lateral ones partially interrupted in the middle and continued on to the scutellum; there is a broad, lateral, golden-grey band interrupted by the sutures; the base of the first abdominal segment has a yellowish band interrupted in the middle; on the middle of the end of the two succeeding segments is a triangular, mesial, golden spot, with an oblique, irregular band on each side, and farther down the sides golden; terminal segments golden; base of wings, scales, and halteres yellowish-white; legs black. The male differs from the female in the front between the eyes, being about one-third as wide as in the latter, while she is rather the smaller. Length, ·22 to ·32 inch."

This description, if borne in mind, will assuredly enable you without difficulty to

detect the culprit when he pilfers from your sugar bowl, or commits an assault upon your person.

The body of the fly consists of three sections, named respectively the Head, Thorax and Abdomen.

The head bears a pair of large, semicircular compound eyes, each having about 4,000 hexagonal facets, each of which lenses corresponds to a single eye, being isolated from the adjacent ones by a dark pigment, and being connected with the optic nerve. There are also three simple eyes or ocelli, arranged in the form of a triangle upon the top of the head, between the compound eyes. Thus liberally endowed with organs of sight, the fly sees in almost every direction without change of position, and by their aid often escapes an untimely end. From the front of the head spring the antennæ, which are short, being composed apparently of only three joints, but really of six: the third is dilated and much larger than the others, while the fourth, fifth and sixth form a kind of plume. When the insect is at rest the antennæ are folded down at the base of the proboscis, so as to be nearly hidden from sight.

The mouth parts are, however the most curious and interesting structures of the head, being modified from the biting or gnawing mandibles of the larva into an organ capable only of sucking up liquids. (See fig. 55). In this proboscis the hard parts, such as the lancets of other flies, are almost obsolete. The maxilla and single-jointed palpi are small, and the short mandibles are of little use, leaving only a fleshy, tongue-like organ, which is bent up under the head when not in use. This tongue, or labium, consists of a tubular bag, formed of thin, transparent membrane, dilated at its extremity into a large sucking disk. This expansion is divided into two broad muscular leaves, supported upon a frame-work of modified trachæ, and presenting a sucker-like surface, with which liquids are lapped up. The modified trachæ which sustains the expanded sucking-disk end externally in projecting hairs, and they give to the fleshy disc the properties of a minute rasp, which is employed by the fly in scraping or tearing delicate surfaces. As Newport states :—" It is by this means that it teases us in the heat of summer when it alights on the hand or face, to sip the perspiration as it exudes from and is condensed upon the skin." With this organ the fly also tastes and sips the delicacies of our tables, for, with the maggots grovelling form, he seems also to a great extent to abandon the lowly and depraved tastes of his youth, and searches thenceforth for sweets and dainties, the pursuit of which often proves fatal to him.

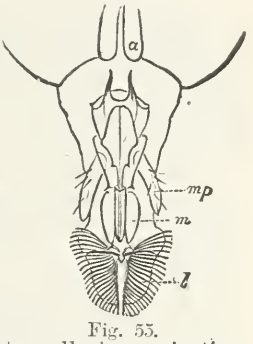


Fig. 55.

The proboscis of the fly is also fitted for other and more dangerous services, as shown by Dr. Thomas Taylor in a paper, (read before the Montreal Meeting of the A. A. A. S.), on the " House-fly as a Carrier of Contagion." While engaged in dissecting the head of a common house-fly, he noticed emerging from the ruptured proboscis a very minute snake-like animal—a species of anguillula—measuring about eight one hundredths of an inch in length by two one thousandths of an inch in diameter. Subsequent examination proved the sucking-tube of the proboscis to be of sufficient diameter to admit of taking up spores of cryptogams, eggs of trichinæ and anguillulæ, or even the latter animals themselves ; thirteen of these having been found in the proboscis of a single fly.

These facts suggested to Dr. Taylor the importance of ascertaining, by experiments, whether flies might not be carriers and distributors of noxious germs. To test the question practically, he placed in a large glass receiver several hundred house-flies and a quantity of the spores of the red rusts of grasses, (Tricholoma) with the following results:

" The flies at first did not seem to esteem the spores as suitable food, but, on the morning of the third day I found that the rust was replaced by larvæ and remains of eggs of the common house fly. The eggs were deposited and hatched between Saturday noon and the following Monday morning, 9 o'clock, or in about forty-eight hours. On the following day I placed in the receiver about a quarter of an ounce of the same description of spores, combined with sugar. The flies partook of this confection, consuming the sugar and most of the spores. In about twenty-four hours after the flies had partaken of

this mixture I killed and dissected a number of them, and found the small intestines intensely coloured, of a deep reddish orange shade, representing the digested spores of the tricholoma. I observed in the contents a few well defined orange spores, but none of them appeared to have germinated. Fastened between the hairs on the limbs of each of the flies examined I found a number of the spores, and the efforts of the fly to get rid of them only resulted in attaching them more firmly to it. They might, however, be brushed off by objects with which they were brought in contact, while their germinating powers would long outlast the life of the insect itself. It was evident from this experiment that flies were capable of conveying such spores to plants and other bodies. On the other hand, the fact that by far the greater part of the spores were consumed, in the one case by the larvæ of the fly, and in the other (*i.e.* when mixed with sugar), by the fly itself, shows that this insect may destroy microscopic germs as well as disseminate them. and indicates that in some cases its agency in keeping down their number may more than counterbalance its action in contributing to their dissemination."

Having thus briefly and imperfectly considered the organs of the head, we find, on examining the second section of the body—the Thorax—that it bears the organs of locomotion, which consist of three pairs of legs, a pair of wings, and a pair of halteres or balancers. The most important of these are the wings, which are not large, when compared with those of many other insects, yet suffice to enable the fly to sustain a swift and prolonged flight.

The vibrations of the wings during flight are exceedingly rapid,—about 330 strokes each second being the usual rate, when the insect is flying swiftly. Thus the fly is able to dart about with a swiftness surprising in so small a body, and which, if possessed by a horse in ratio to its magnitude, would enable it to traverse the earth with inconceivable velocity.

The *halteres*, *balancers* or *poisers*, as they are indifferently called, are two small club-shaped organs, which occupy the position of the second pair of wings in insects of other orders, and which may be considered as merely modified or rudimentary wings. They are kept in a constant vibration during the insect's flight, which they serve to regulate, as has been proved by experiments. The possession of these little organs enables the diptera to change the direction of their flight far more quickly than other insects, as may be seen by watching the erratic movements of flies hovering in the air. These balancers are more easily seen in some of the larger species, such as the *tipula* or daddy-longlegs, which sometimes enters our houses from the neighbouring fields. In the house-fly, as in many species, they are partially hidden beneath a pair of protecting horny scales, which project from the sides of the thorax.

The legs are divided into five parts, or joints; first, the *coxa* or hip, by which the leg is articulated to the body, then a short, round joint called the *trochanter*, next the *femur* or thigh, then the *tibia*, and lastly the *tarsus* or foot. This latter merits particular attention, on account of its peculiar powers. It is subdivided into five joints, the last of which bears the apparatus which permits a fly to crawl so easily on the most perfectly polished surfaces, even when it is beneath them. On examining the last joint, that bearing the claws, it is found to be expanded into two large *pulvilli* or pads, thickly set with minute hairs or filaments, each of which terminates in a small fleshy bulb, kept moist by a viscid exudation. Although very minute, they are so numerous that the foot adheres firmly enough to sustain the fly in his pedestrian excursions overhead.

The abdomen, or remaining section of the body, presents no external appendages for present consideration, so that we will turn for a moment or two to the internal structure of the fly, merely to mention the principal features. Directly under the dorsal surface or back of the insect is attached the dorsal vessel, or heart, a tubular vessel, running the full length of the abdomen and being constricted as it enters the thorax. This tube is situated in a cavity in which the blood collects on completing the circulation of the body, and is furnished with valvular orifices, which permit of the returned blood entering the heart, but which permit none to escape therefrom. The heart is also constricted at several points, and divided into a series of chambers, separated by valves, through which she blood is continually forced forward from one chamber to another, and finally dis-

tributed to the extremities of the body, from which it returns through irregular channels (there being no special vessels for its conveyance), to the dorsal cavity.

Below the heart and occupying the median line of the body is the alimentary canal which may be divided into four parts:—the gullet, the crop, the stomach, and the intestine; each having a special structure and appendages, which it is not possible to satisfactorily describe here.

Under this, along the floor of the body is located the nervous column, which, however, on entering the head splits into two branches which embrace the gullet, and knit together above it, expanding into a bilobed ganglion, or *brain*, from which nerves are distributed to the different organs of the head. In the thorax is situated another large ganglion, supplying the appendages of that segment, while in the abdomen smaller ganglia are found from which ramifications extend in every direction.

The respiratory system is also a complicated one, and differs more in its arrangement from the analogous organs of higher animals, than do the circulatory, nutritive and nervous systems. Along the under surface of the body are placed several pairs of minute breathing orifices, called *stigmata* or spiracles, protected from the intrusion of solid particles by an intricate network of five ramifying filaments proceeding from the circumference. Through these spiracles the air enters into lateral trachæ or air tubes, from which it is conveyed by smaller branches which ramify to all parts, and to all organs of the body. By means of these minute air-vessels the blood is oxygenized as it forces its way between them in returning to the dorsal cavity. The fly has also two capacious air-sacs or pouches in the base of the abdomen, and according to some authors, two much smaller ones in the front of the head.

The foregoing is but a meagre outline of the structure and organs of the house-fly, of which the more closely we study its anatomy, either in the larval or perfect state, the more are we struck by the admirable adaptation of its structure to its mode of life.

A much disputed point in connection with the house-fly is whether it has the habit and ability to bite persons, as some other flies do. Perhaps the great majority of people would answer in the affirmative, and conscientiously attest that they had themselves been so bitten. From the formation of the fly's proboscis, with its feebly developed mandibles, it hardly seems probable that the skin could be punctured. Yet the authors of the little book already mentioned (Earth-worm and House-fly) after microscopic examination and description state that the lancets, representing the maxillæ and mandibles, "are employed to puncture the objects from which the fly sucks the juices," and are the weapons that annoy us. However this may be, it appears that the culprit who thus assails us, especially during showery weather and late in the season is a distinct species, although it so closely resembles *M. domestica* as to deceive all but entomologists familiar with these insects. Its name is *Stomoxys Calcitrans*, and it is distinguished by its long horny beak, which, as pointed out by De Geer, has a long and very sharp lancet sliding in a groove, while the fleshy sucking discs at the extremity of the proboscis are small and inconspicuous as compared with those of the house-fly. There is also a slight, but perceptible difference in the wings, and in the position in which they are held by the insect.

One naturally associates the house-fly with the habitations of man, but it is not confined to them, but extends its range over the whole country, and may be found almost universally distributed, and prepared to welcome the first human visitor to any locality. In the May number of "Psyche" appeared a short article by a Collector in the far West, showing that even in the secluded cañons of the Rocky Mountains the newly pitched tents would soon become disagreeably filled with flies, chiefly and unmistakably *M. domestica*. As the article gives an interesting account of the manner in which flies are sometimes destroyed by wasps, I will quote a portion of it.

"While camping in Santa Fé Cañon, N. Mexico, in August, 1880, this plague of flies seemed about to be unusually formidable. On the very first night the lower surfaces of the roofs and ridge-poles of the tents were fairly blackened by the immense multitudes of dipterous pests. The next morning it was observed, somewhat to the alarm of the women and children of the party, that large numbers of so-called yellow-

jackets (*Vespa occidentalis*, Cr.) were entering the tents. For some time it was supposed that the object of the new-comers was to forage for sugar and other camp supplies. But before night it was noticed that the numbers of flies in the tents had been perceptibly reduced, and on the second morning it was discovered that the wasps were intent on the acceptable task of removing our troublesome guests. There were generally as many as forty or fifty wasps in each tent at once, and each wasp was observed on leaving the tent to be carrying out the body of a fly, not for burial, nor as food for its captors, but for storage in the nests of the wasps, and undoubtedly as food for their young. Each captured fly, before removal from the tents, was deprived of its wings and legs, and on several mornings we were awakened from our slumbers by these severed members dropping upon our faces. The wasps were unremitting in their labors from daylight to dusk, and in four or five days the flies had ceased to be troublesome by their numbers, the wasps having gained upon them almost as rapidly as they entered the tents. Occasionally a specimen of *Vespa maculata* (Linn.) was observed co-operating with *V. occidentalis*, Cr., in the removal of the flies."

Although flies are able to live for several months, but a small percentage of them survive to die of pure old age. Dangers imperil their existence at every stage; a great proportion of the eggs, pupæ and larvæ are devoured by other insects, birds and fowls, or destroyed by floods and droughts; while such as reach maturity find spiders, birds, poisons, traps and deadly enemies on every side, to thin their ranks, so that of all the mighty armies of Summer, barely a corporal's guard survives until the Winter. Late in the autumn the stragglers are seen, dingy and draggled, feebly crawling about the walls, and all unlike the trim, active insects that danced on tireless wing in the summer sunbeams. Some even manage to survive the winter, by hybernating in crevices, and come forth on the approach of spring, looking still more worn and decrepit, to continue the race.

One enemy which attacks them in their old age must be specially mentioned, as its effects often arouse some curiosity in those who observe them. In the autumn many dead bodies of flies, still in the attitudes of life, are seen adhering to the mirrors, curtains and other articles in our rooms. On closer inspection a small cloudy spot will be seen to surround each, and the abdomen to be much distended, with broad whitish zones separating the segments.

A touch of the finger makes the body crumble into dust; the whole of its contents having been consumed by the fungus which is the cause of these appearances. This "fungus is a species of the genus Seprolegnia, formerly called Sporondonema, Empusa, or Achlya. It consists of short jointed threads, two or five millimeters long, growing from the bodies of flies usually in autumn. These threads enlarge in the outer end or last joint, which becomes filled with swarm spores, that, as soon as mature, burst their envelope, move about for a few hours, then come to rest, generally near the parent filament, and immediately begin to grow.

The reason that the fly remains standing where he dies is that, as the fungus consumes his internal organs, he becomes too enfeebled to overcome the adhesion of his feet to his last resting place, and the viscid exudation from the filaments of the pulvilli harden and cement them so firmly to the spot, that even after death "the fly sticks to the wall."

DIPTERA.—TWO-WINGED FLIES.

By Edmund Baynes-Reed, London, Ont.

It has been estimated by competent authority that the insects comprise about four-fifths of the whole animal kingdom; it is therefore natural that the history of the lives and habits of this large portion of animated nature should be of vast interest and importance to mankind.

In the recognized scientific classification of insects those possessing in the perfect state only two wings are known as *Diptera*, from two Greek words, *dis*, two, and *pteron*, wing. And we purpose in this paper to give a brief outline of the history of some of the common members of this great family of *Diptera*—or flies, as they are more usually termed.

The same authority quoted above estimates the number of species of *Diptera* at 24,000. Prof. Packard, in his Guide to the Study of Insects, states, "There are about 2,500 species of North American flies described, and it is probable that the number of living North American species amounts to 10,000. In Europe there are also about 10,000 known species belonging to about 680 genera.

According to the distinguished Entomologist, Westwood, "The two-winged insects constitute one of the most extensive orders of the *Ptilota* (winged insects), not only in respect to numbers of *distinct species*, but also to the swarms of individuals of the *same species*; and which from their constant attendance upon man have attracted his attention from the earliest ages. It is not, however, from their size that this has been the case—since few species exceed an inch in length—nor is it on account of their beauty, for the majority of them are of dull colours; their forms, too, are rarely elegant, and the transformations of many are unknown. They owe their notoriety, if we may so speak, in many cases to the disgusting habits and appearances of their preparatory state—where many of them revel in filth of every description—and to the annoyances caused by the reiterated attacks of their numberless tribes in the perfect state, both directly upon ourselves, and indirectly upon our living and dead property of almost every kind."

Flies can at once be easily recognized from other insects by their having only two wings; these are transparent. Instead of the hind wings common to other insects flies have two little projecting appendages, which have received the name of "halteres," or "balancers." These characteristic organs may be observed in the place usually occupied by the hind wings, and are kept by the insect in nearly constant vibration. There is much difference of opinion among Entomologists as to the special functions or uses of these balancers; some thinking they are organs of hearing, others believing they are appendages to the respiratory organs, and some being of opinion that they serve simply to regulate the flight of the insect.

Flies are suctorial insects, and, quoting again from Westwood, "their mouth is formed only for imbibing fluid matter; when, therefore, such fluid is enclosed in peculiar vessels, the internal pieces of the sucker are employed as lancets to pierce the envelope, and afford a passage to the fluid, which ascends by power of suction, produced by the fleshy lips of the insect into the mouth."

The head of a fly is very distinct, and is attached to the body by a very slender neck; the eyes are exceedingly large, with numerous facets; and those of the male fly in some species take up nearly the whole of the head.

The larvæ of flies are footless, fleshy grubs, of a whitish colour, and a cylindrical, worm-like shape; according to Packard, in some of the higher families they have a distinct head; but in the family of *Muscidæ*, to which the common house-fly belongs, they are often headless, and are then called maggots.

The metamorphosis, or change into the pupal state, is most complete in all the *Diptera*. Like that of the *Hymenoptera*, the enclosure consists of a thin, transparent covering, the parts being free and easily recognizable; in many species, however, the insect undergoes its change within the larval or caterpillar skin, which then becomes hardened and forms a firm protecting case for the pupa.

Most *Diptera* lay eggs, but a few produce living larvæ, and are then called *Viviparous*, in contradistinction to the egg layers, which are termed *Oviparous*. Some few species also retain the larvæ in the interior of their body until they have reached the pupal state, and then discharge them in that condition—these are called *Pupiparous*.

One of the most noticeable features of this great family of insects is their very great profusion, and the large number of species they embrace. In all parts of the world, and at almost all seasons of the year, they seem to furnish an inexhaustible supply. The numerous class of insectivorous birds depend largely on them for their subsistence.

Another, and most important duty they fulfil is that of acting as part of nature's great army of scavengers, and removing the innumerable quantities of decaying animal and vegetable matter that are to be found on every hand. Indeed were it not for the great assistance thus rendered by hosts of insects, acting in many cases invisibly to us, it is doubtful if human life could be sustained with any degree of health or comfort.

In this great work, assigned by a beneficent Creator to the insect world, the *Diptera* or flies play a most important part; their enormous fecundity and their marvellous rapidity of generation adapting them specially for this work.

On the other hand there is no doubt that much annoyance and irritation are caused both to man and beast by the attacks of flies. With the sonorous boom of the mosquito sounding in our sleepless ears, it is difficult to philosophise calmly on the operations of this blood-thirsty insect, and to believe that there may be even a remote possibility that the attacks of this persistent and persevering fly may be conducive to our health.

To what a world, too, of untold misery is that unhappy animal subjected in the season of "fly-time," who, like Burns' "Maggie" of poetic fame, possesses "scarce a stump" to defend itself against the persecution of its irritating tormentors.

There have been trying occasions, we strongly suspect, when some of us would have been only too glad to have been able to have afforded proof to demonstration that Lord Monboddo's celebrated caudal theory was founded on fact, and that our personal comfort, as well as our landed possessions, would have been greatly enhanced by an actual and veritable enjoyment of an "estate in tail."

According to the late Prof. H. Loew, all *Diptera* have been for many years past divided into two large sections—*Nemocera* and *Brachycera*.

The first section of *Nemocera*, or thread-horned *Diptera*, have antennæ with more than six joints, and the palpi with either four or five joints. The second section of *Brachycera*, or short-jointed *Diptera*, have not more than three distinct joints of the antennæ, and the palpi have not more than two joints, and often only one.

This section embraces by far the largest number of species.

Section I.—Nemoceræ.

In this are comprised those comprehensive families known popularly as Gnats or Mosquitoes, and Daddy-long-legs, or the *Culicidæ* and *Tipulidæ*, to use scientific names.

Our well known acquaintance, the Mosquito—known unfortunately to most of us by painful experience—will stand as a representative of a very large and interesting family who are found in every part of the world—both in artic and tropical regions as well as in more moderate climes. Loew's catalogue of *N. A. species* comprises a list of 32. Figure 17 represents a female Mosquito, *Culex pipiens* Linn; the males are harmless, leaving all the biting to their more irritating wives.

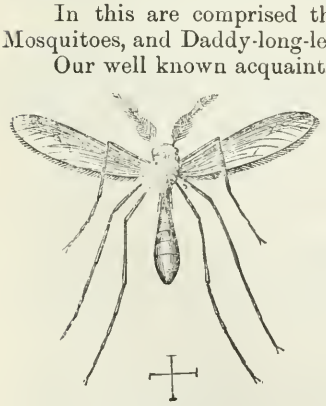


Fig. 17.

Fig. 18.

Fig. 18 shows the mouth parts of the female, and the formidable lancet she employs

on her work. The eggs are laid in boat-like masses on the water and the larvæ are altogether aquatic—feeding generally on decaying vegetable matter at the bottom of the water. In this state they may be considered as essentially beneficial, checking by their operations the malaria arising from stagnant water.

The *Tipulidæ*, or crane flies, are well known to all under the familiar name of Daddy-long-legs. These, of course, are only the typical members of this large family, and are found in great numbers in wet meadow lands; the larvæ feed on the roots of grass, and very often cause a great deal of damage.

The flies have a slender cylindrical abdomen, and long slender legs, which enable them to pass easily over the higher blades of grass; the eggs are deposited by the female in the ground, and the larvæ live and undergo their transformations there.

In this section we also find a large family of insects of very small size, some of which in their earlier state reside in gall-like excrescences which they produce upon various plants; some "only produce a folding of the leaf, swelling of a leaf-rib, or arrest the growth of a bud or stalk."

These insects are known as *Cecidomyides*, or midges. Those well-known pests, the Hessian fly and the wheat midge have been well described in former reports by the Rev. C. J. S. Bethune, and their life history has been carefully related, we will therefore only refresh our readers' memories by reproducing their likeness.

Fig. 19. Wings open.

Fig. 20, Wings folded.

Fig. 19 represents a highly magnified specimen, with the wings expanded, of *Cecidomyia tritici*, Kirby, the wheat midge.

Fig. 20 shows the same insect with the wings closed.

The eggs are laid (Fig. 21) in the blossom of the wheat; and produce in about a week the larvæ, of which Fig. 22 is a highly magnified representation.

Fig. 21. Eggs.

Fig. 23 shows a wheat kernel affected by the midge. The wheat midge has transparent wings, while those of the Hessian fly, (Fig. 24), *Cecidomyia destructor*, Say., are dusky, as will be seen by reference to Fig. 24. The wheat midge attacks the ear, while the Hessian fly attacks the stalk.

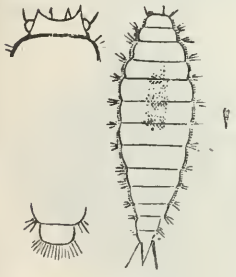


Fig. 22. Larvæ.

Fig. 23. Wheat leaf.

Clover Midges.

Fig. 25 is another midge known as *Cecidomyia trifolii*, Low, or the clover-leaf midge; the larva attacks the white clover, living within the folded leaves. According to Prof. Comstock "such leaves on being opened were found to contain from one to twenty whitish, or pale orange maggots, resembling much the larvæ of the clover seed midge, but being somewhat smaller. The younger maggots were nearly white, while the older ones were of a decided orange hue."

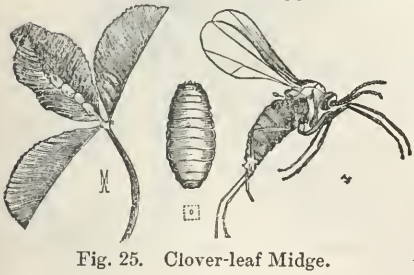


Fig. 25. Clover-leaf Midge.

The clover seed midge, *Cecidomyia leguminicola*, Lint. as well as the clover leaf midge, were described by Mr. Wm. Saunders in last year's report.

Fig. 24. Hessian Fly.

Fig. 26. Larvæ.

Fig. 26 shows the larva highly magnified — the hair line on the side showing the natural size.

Fig. 27 represents the female fly, with her four-pointed ovipositor extended. At *b* we have the head highly magnified, and *c* and *d* show the antennæ, and the ovipositor enlarged.

Fig. 28 is the male also enlarged; *b*, the head, *c*, the peculiar clasping organs, and *d* the pedunculated joints of the antennæ, which differ from those of the female.

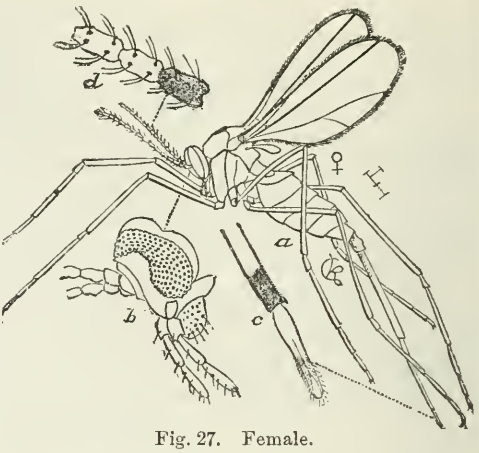


Fig. 27. Female.

Grape-Vine Galls.

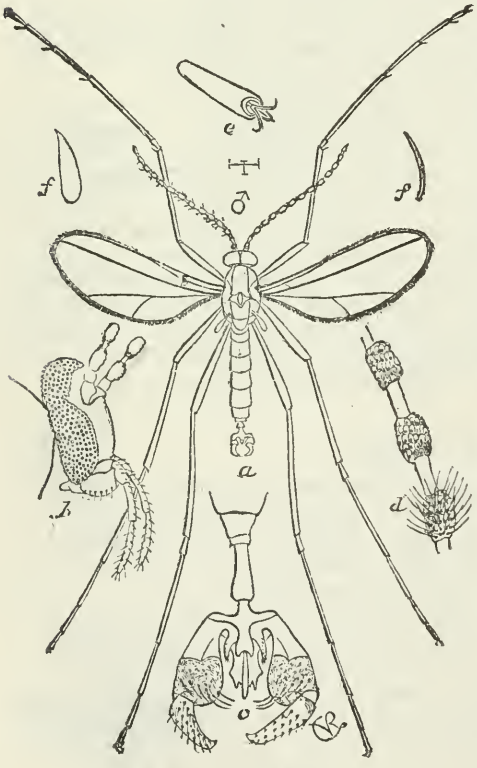


Fig. 28. Male.

We will now refer to these *Cecidomyides* who produce gall-like excrescences on the plants they attack, and as specimens of their destructive work—we refer to the grape-vine galls. The flies that cause these are not yet described, but they are very similar

Fig. 29. Gall Fly.

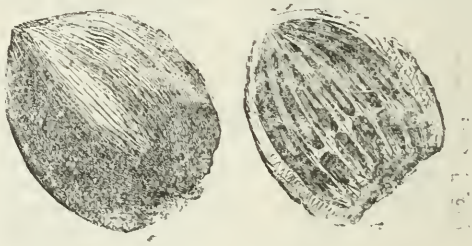


Fig. 30. Vitis Pomum.

to that shown in Fig. 29, which is a willow gall, known as *Cecidomyia Strobiloides*, O. Sacken.

Fig. 30 is the form known as the grape-vine apple gall, *Vitis-pomum*, Walsh and Riley. This gall is divided into numerous cells, each containing a larva.

Fig. 31 is the grape-vine filbert gall, *Vitis-coryloides*, Walsh and Riley.

Fig. 32 shows the grape leaf trumpet gall, *Vitis-viticola*, Osten Sacken. The colours of these galls are bright crimson; they are generally found on the upper side of the leaf —the galls are hollow, and contain a pale orange larva.

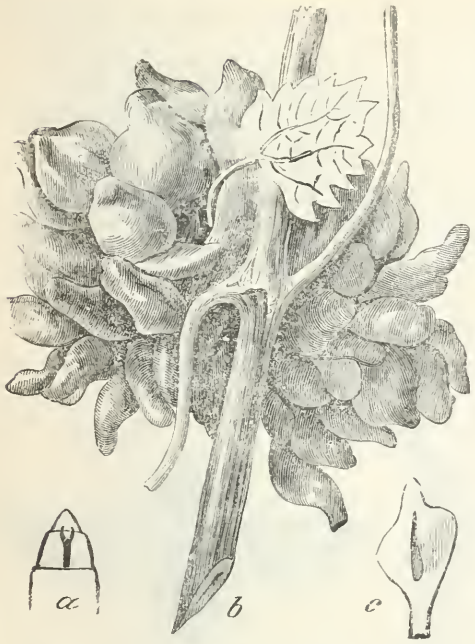


Fig. 31. Vitis-coryloides.

Fig. 33 is the grape-vine tomato gall, *Vitis-tomatos*, Osten Sacken. This gall is made by a little fly, named *Lasioptera Vibis*, which, as well as the gall, were both described by Baron Osten Sacken.

Fig. 32. Vitis-viticola.

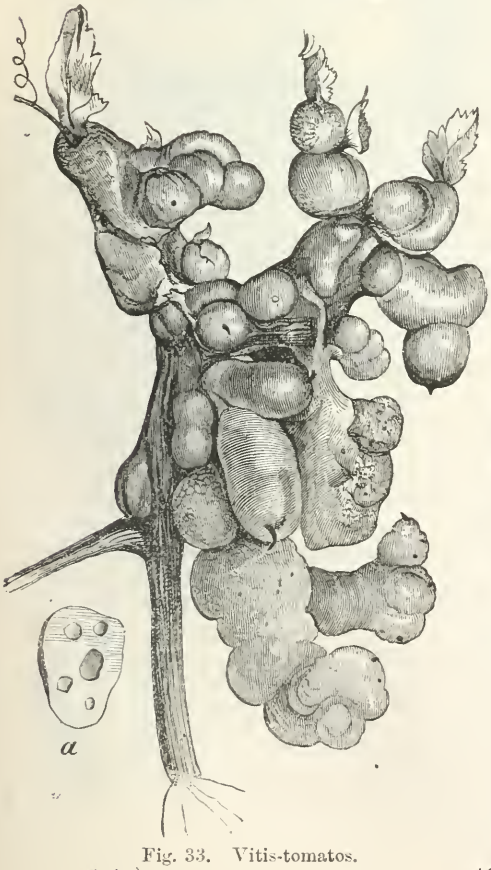


Fig. 33. Vitis-tomatos.

Another species of midge is shown at Fig. 34, which represents *Diplosis resinicola*, Osten Sacken, the resin-inhabiting Diplosis. The larvæ are found feeding in companies of thirty and forty, in the pitch ex-

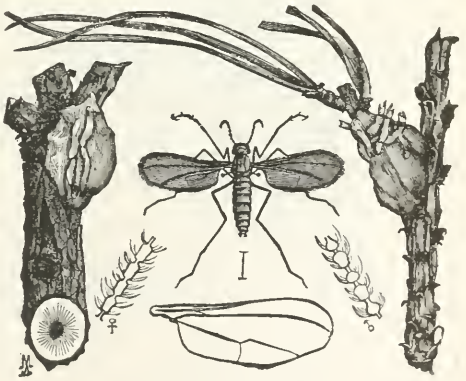


Fig. 34. Diplosis.

uding from the pine tree. These are pale orange, becoming brighter just before pupating. "When about to give out the adult the pupa works its way to the surface of the resin, and protrudes half its body, so that there is no danger of the midge becoming fastened in the sticky gum. Dried lumps of resin, fairly bristling with protruding pupa skins, are a common sight on trees affected by these insects."

This midge has been observed in Florida, and at Ithaca and Tarrytown, New York State, and it is quite possible it may occur in Canada.

The history of another family belonging to this section of Diptera is a curious one. The family is called *Sciara*, and belongs to the genus of the Tipulidæ. Several species are known to occur in Canada. The larvæ are noticeable for their peculiar habit of congregating together and exhibiting the strange phenomenon of an assembly of larvæ without feet marching in procession.

Prof. Packard says "They are more gregarious than the other genera, and have the singular propensity of sticking together in dense patches, generally under the bark of trees. When full grown they sometimes march in procession in a dense mass, sometimes several feet long and two to three inches broad and half an inch in thickness, whence the Germans called them 'Army Worms.'"

Section 2.—Brachycera.

We now come to the second great division or classification of Diptera, known as the short-horned flies.

The *Tabanidæ*, or Horse Flies, a well-known group—the insects of which are remarkable for their strength, daring and courage. Fig. 35 represents a common species, *Tabanus atratus*, Fab. Its large size and powerful bite render it formidable. Like the mosquito it is only the females which bite, the males being innocuous, and living on the juices of flowers. In its larval state, according to the late Mr. Walsh, the talented entomologist, it is useful to man, as it feeds on snails and the larvæ of root-eating insects.

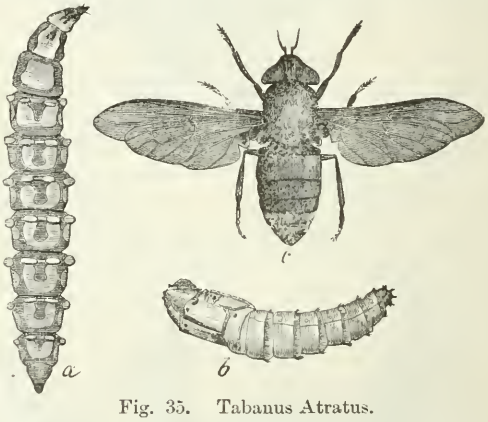


Fig. 35. Tabanus Atratus.

The *Asilidæ*, or Robber Flies, are stout, strong insects, with long bodies. They are very rapacious, seizing and flying off with the insects they capture.

Fig. 36 shows one of these robbers, named *Trupanea apivora*, Fitch, or the Bee-killer. They are very destructive to the hives, capturing the bees on the wing, one having been observed by Professor C. V. Riley of Washington, to kill 141 bees in one day,

Fig. 36. Trupanea Apivora.

The *Bombilidæ* are pretty, hairy flies, with an oval body and a long proboscis. They are exceedingly swift fliers.

The *Syrphidæ*, known as the hoverers, hawk flies and drove flies, are described by Packard as "those gaily coloured flies so useful to agriculturists, from their habit of feeding on plant lice, closely resemble the wasps in form and colouration, having hemispherical heads, large broad eyes, and rather flattened bodies, ornamented with yellow bands and spots." They hover in the hot sun over and above the flowers, resting upon them to feed on their sweets. The larvæ either live in the water, where the body ends in a long extensile breathing tube; or are terrestrial living in decaying wood, or parasitically in nests of bees, or, as in Syrhus, live among plant lice.

Fig. 37. Syrhus.

The species of *Eristalis* produce the well known aquatic larvæ known as "rat-tailed." A kindred species is shown at Fig. 37, *Heliophilus Latifrons*, Loew.

Fig. 38 shows the larvæ of a Syrhus fly feeding on aphis.

Fig. 38.

Fig. 39 represents another Syrhus fly, *Pipiza Radicans*, Walsh and Riley, whose larva lives under ground,

and feeds both on the apple-root louse, *Eriosoma Pyri*, and the grape-root louse *Phylloxera Radicola*.

Tha *Ostridæ*, Breeze or Bot flies. The more common of these have already been described by the writer in a former report.

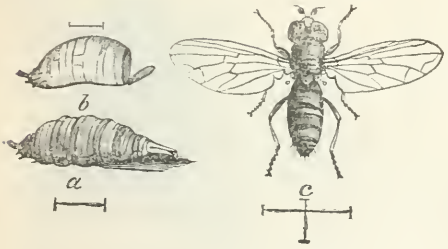


Fig. 39. Syrphus Fly.

Fig. 40. Horse-breeze Fly.

Fig. 41. Female.

The Horse breeze fly, *Œstrus Equi*, Fab. Fig. 40, male; Fig. 41, female.

The eggs are laid on the hairs of the animal (See. Fig. 42), and being licked off by the tongue, are thus conveyed into the stomach of the horse, and attaching themselves to the sides of the stomach (see Fig. 43), pass through this stage of their existence. Another fly, *Œstrus bovis*, Lat., the ox-bot fly is shown at Fig. 44, while at Fig. 45 is shown the fly just emerging from its cocoon, and a view is also given highly magnified, of the ovipositor, or instrument, by which the female deposits her eggs.

Fig. 42. Eggs of Horse-breeze Fly.

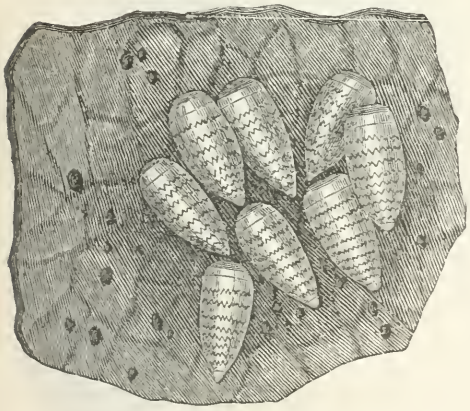


Fig. 43. Larvæ of Horse-breeze Fly.

Fig. 44. Ox-bot Fly.

The sheep bot fly, *Œstrus Ovis*, Linn. is shown at Fig. 46. This fly attacks the nostrils, depositing her eggs there.

All these bot and breeze flies are greatly dreaded by the animals they attack, and their appearance causes great commotion amongst them, and very often produces a regular stampede—the animals endeavouring by their terrified flight to escape their insect tormentors.

We now arrive at our last division of this section, the *Muscidæ*. This is a large family, and contains a great number of species. The typical member is *Musca domestica*, the common house fly, and its history will be found more in detail in another part of this report. To its ranks belong the celebrated "Tsetze Fly," *Glossina Morsitans*,

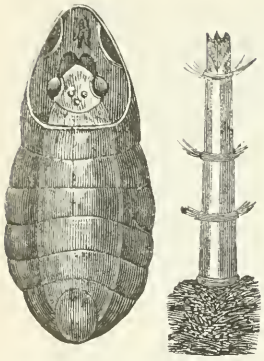


Fig. 45. Ox bot Fly Larva.

Westwood. This little fly, not bigger than the common house fly, is the great obstacle to the exploration of Central Africa. "It is not dangerous to man, to any wild animals, nor to the pig, the mule, the ass or the goat. But it stings mortally the ox, the horse, the sheep, and the dog, and renders the countries of Central Africa uninhabitable for these valuable animals."

The genus Tachina, of which Fig. 47 represents a species, is parasitic in caterpillars.

Fig. 46. Sheep bot Fly.

Tachina doryphoræ, Riley, feeds on the larvæ of the potato beetle.

The Red-tailed Tachina Fly, *Nemoraea leucaniæ*, Kirkp., Fig. 48, is parasitic on the army worm moth, *Leucania unipuncta*, Haworth. The fly deposits her eggs upon the fore part of the body of the worm. Prof. Comstock says "That as many as eighteen eggs are laid on a single worm, but the usual number is about five. These eggs are so ingeniously placed that the worm can by no possibility reach them with its jaws, or get rid of them in any other way. Mr. Howard says that he has searched for hours in a field infested with army worms without finding a single full-grown worm that did not carry one or more of these eggs upon its back." In Fig. 32, just underneath the fly is shewn the forepart of an army worm exhibiting the placing of the parasitic eggs.

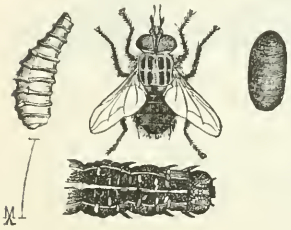


Fig. 48.

Fig. 47.

Sarcophaga, the Flesh Fly, is one of the viviparous species alluded to before.

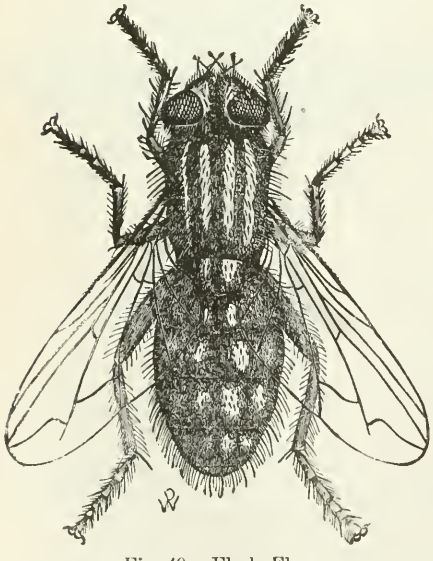


Fig. 49. Flesh Fly.

Fig. 49 is an enlarged representation of *Sarcophaga carnaria*, Linn. The flesh fly and Fig. 50 shows the maggot.

The female is exceedingly prolific. The entomologist, DeGeer, vouching for the development of 20,000 larvæ in one female.

These flies sometimes deposit their larvæ on living animals, and thus become parasites.

Prof. Comstock says that "specimens of a flesh fly were reared from pupa of the Cotton worm, *Aletia Argillacea*, Hubner. These proved to be specimens of *Sarcophaga Sarraceniæ*, Riley, a probable American variety of that wide-spread scavenger, S. Carnaria, a species common to Europe, America, and Australia, certainly and probably elsewhere to be found. *Sarraceniæ* was first described by Prof. Riley as feeding upon the dead insects to be found in the leaves of *Sarracenia*, the pitcher plant. Fig. 51 represents the insect in all its stages.

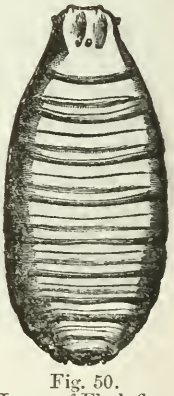


Fig. 50. Larva of Flesh fly.

The *Anthomyiæ* are to be found about flowers, and their larvæ live on decaying

vegetable matter, and are all parasitic. Fig. 52 represents *Anthomyia Radicum*, Linn., var. *Coleopteri*, the Anthomyid egg parasite which was found by Prof. Riley to be parasitic on the eggs of the Rocky Mountain locust. In its parasitic capacity it has been most useful.

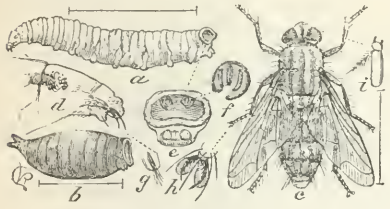


Fig. 51

Another species, the onion fly *Anthomyia Ceparum*, Bouche, Fig. 53, attacks the root of the onion. The figure shews the onion bulb with the pupa in the centre.

The larvæ of another fly, *Anthomyidæ Zeæ*, of Riley, attacks seed corn, and the radish is also infested by *Anthomyiæ Raphani*, Harris.

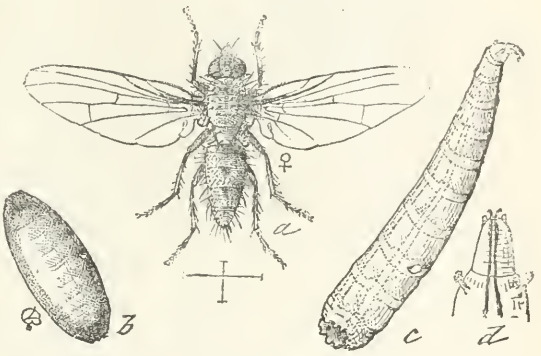


Fig. 52.

Fig. 54 represents another onion fly, *Ortalis Flexa*, of Wiedmann ; the maggot feeds on the root ; other of the same species feed on the leaves, and afterwards the fruit, of

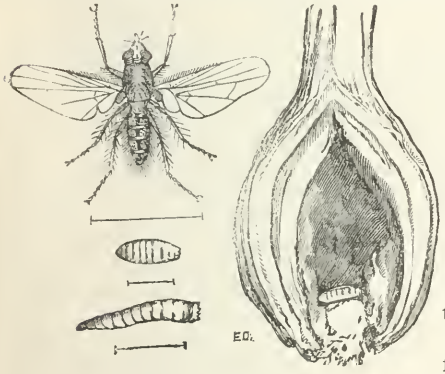


Fig. 53. Onion Fly.

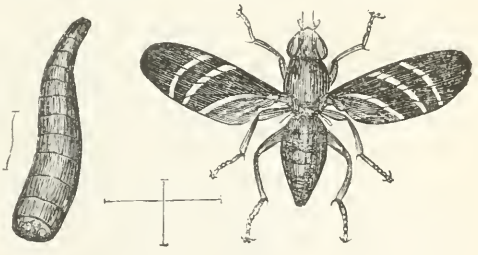


Fig. 54.

the cherry, olive, and orange.

The remaining members of this section of the flies are those which are known as *Pupiparous*, and consist of she *Hippoboscidæ*, the forest flies and sheep ticks.

This closes our list, brief as it has necessarily been, of this great group of insects.

CHRYSOMELIDÆ—LEAF-EATERS.

By W. Hague Harrington, Ottawa.

The numerous species which are comprised in this extensive family of Coleoptera, are universally phytophagous, or plant-feeding beetles, and many of them are well known as destructive insects. The family name is derived from two Greek words signifying "Golden Apples," and has been applied to this group of beetles because so large a proportion of the species have rounded forms and bright colours.

Although the family embraces several thousand known species, none have yet been discovered which exceed an inch in length, and few, if any, attain that size, while the vast majority of them are small, and often very minute. It is not from their size that they are to be feared, but from the very rapid rate at which they increase in number, and enlarge the area of their depredations.

In shape they are oval or oblong, with numerous short and robust species. The eyes are prominent, and the antennæ comparatively short. The larvæ of the larger species are found feeding upon leaves, and are stout, cylindrical, fleshy grubs, with thoracic legs. They are frequently highly coloured, but the majority are not pleasing objects, and many species cover themselves with a coat of the excreted fragments of devoured leaves, which gives them a filthy appearance. The larvæ of many small species are little flattened worms mining in the leaves, that is they feed upon the inner substance of the leaf, leaving the upper and lower surfaces untouched, and making disfiguring blotches, such as are also caused by larvæ belonging to other orders.

The beetles are frequently very handsome; resplendent with gay colours and bright metalic lustres, or ornamented with quaint and striking markings. About five hundred species are recorded from the United States and Canada, and in both countries considerable damage has been inflicted by different species.

Descriptions of several species and accounts of their operations have already been given in previous Reports, but as they are scattered through the different numbers, and perhaps inaccessible to some who may receive this, a brief review of them (as they are reached) may not be superfluous.

The genus Donacia, with which the family commences, approaches in some respects to the Cerambycidæ, or "long-horned" beetles, and serves as a partial link between that family and the Chrysomelidæ. The beetles of this genus differ from those of most other genera in having longer and more cylindrical bodies and longer antennæ. The larvæ are said to live in the stems of water-plants, and to make a leathery cocoon in the earth before transforming. I have often found empty cocoons of such nature attached to roots of aquatic plants.

Donacia proxima, Kirby, probably our largest species is a fine beetle of a deep bluish-black colour above, while the under surface is silvery-white, being densely covered with short hairs. The thighs of the hinder legs (as in many of the species) are swollen, and bear a short tooth. The beetles are found on hot summer days upon the floating leaves of the water-lilies, where they mate and sport in the bright sunshine, which gives to them an added lustre.

Donacia subtilis, Kunze, our most common species is very abundant in June and July upon rushes and sedges. *D. æqualis*, Say, may be found towards the end of July, feeding upon the leaves of Sagittariæ. *D. pubescens*, Lee., owing to a coat of yellowish hair, lacks the lustre of the previous species.

Hæmonia nigricornis, Kirby (*Melsheimeri*, Lac.), is a smaller and more delicate beetle, of a yellowish colour, and having the tip of the wing-cover prolonged in a sharp spine. It occurs somewhat abundantly in the latter part of June upon the leaves of *Potomageton natans*, where it is, from its colour, very inconspicuous. It seems equally at home in the water as in the air. I have seen, and captured, specimens paired beneath the surface of the water, while other individuals, also completely submerged, were feeding upon the epidermis of the leaves. It walks easily upon the surface from plant to plant, and has the habit of running a little distance upon the water and taking flight therefrom, instead of directly from the leaf upon which it has been.

Leaving the aquatic species, we come to a small, slender beetle, very common upon flowers in spring and early summer. This insect, *Orsodachna Childreni*, Kirby, varies remarkably in coloration, and several of its varieties were formerly described and known as separate species. It ranges in colour from a tawny-yellow to black, and one well-marked variety has the head and elytra black, while the thorax is red.

Syneta tripla, Say, is a pretty reddish or yellowish beetle, found in May or June feeding upon the leaves of beech, elm, etc.

Lema trilineata, Oliv., is about as long as the last species, but is broader and more stoutly built. It is an orange-red beetle, with black eyes, feet and antennæ. There are also two black spots upon the thorax, and the elytra bear three broad, black stripes, which give to the beetle its specific name. (See Fig. 56.) It is found abundantly upon potato plants throughout Canada, and is popularly known as the "Three-lined potato beetle." The eggs are deposited upon the under side of the leaf

Fig. 56.

(see Fig. 57*d*), upon which the dirty-yellowish larvæ, covered with mantles of their own excrements, may be found feeding in mid-summer. (See Fig. 57*a*.) They attain their full size in about two weeks, when they descend to the ground and transform in earthen cells, formed of small grains cemented together by a gummy exudation from the mouth. In about a fortnight the rather handsome beetles emerge, and may be found in about potato patches during August and a portion of September.

Fig. 57.

Crioceris asparagi, Linn., the European asparagus beetle, is a closely allied species, which has followed to America the celebrated food-plant from which it derives its name. It was figured in the Reports for 1880 and 1881, but as no description of the beetle was then given, I will insert it here as given by Miss Ormerod, in whose valuable "Manual of Injurious Insects" it is the first species described. Fig. 58 shows the beetle, larva and egg, all much magnified; the natural length of the egg and beetle is shown by the lines at the foot of the figure. The eggs are attached by one end along the young shoots, as figured. The grubs are of a dirty olive or slate colour; are fully fed in a fortnight, when they descend into the ground, transform in parchment-like cocoons, and in two or three weeks emerge as perfect beetles. These are about a quarter of an inch long, blue-black or greenish, the body behind the head red, with two black spots, the wing cases are ochreous-yellow, with a line down the centre of the back, a branch from each side, and a spot at base and tip of each wing-case. The beetles on emerging from the ground lay their eggs, and the insect is found in all stages, from about the middle of June to the end of September.

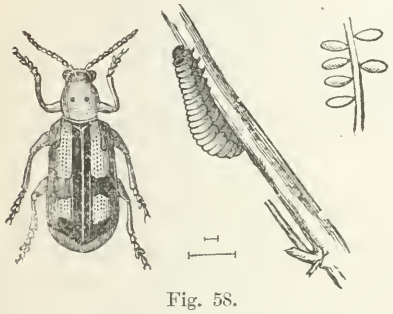


Fig. 58.

This beetle appeared in eastern New York more than twenty years ago, and threatened at one time to destroy the extensive asparagus plantations on Long Island. Its depredations were soon checked, however, and its spread prevented. Our Report for 1880 gave methods of dealing with the larvæ, but did not mention the application of freshly slacked lime, which is stated by Mr. A. S. Fuller (Am. Ent., page 4) to be the most practicable and effectual method. The best time to dust the plants, with the finely powdered lime, is while the dew is still on them, or after a shower. The lime almost instantly kills every larva it touches, and those that escape may be destroyed by a second application. So effectual was this process found, that about one application every alternate season sufficed to keep the insect in check.

Anomœa laticlavia, Forst., is a stout beetle, slightly more than one-quarter of an inch long and half as wide. It may be considered as belonging to the aristocracy of the Chrysomelidæ, for its specific name of *laticlavia* means, in Latin, having a broad purple stripe—a mark of distinction borne by senators, militarv tribunes, and the sons of distinguished families. The abdomen, legs, eyes and antennæ are blackish, the head, thorax and elytra are ochraceous, while a broad purplish black stripe runs down the back, and a narrow one along the margins of the elytra. Found upon willows, cherry, etc., in June and July.

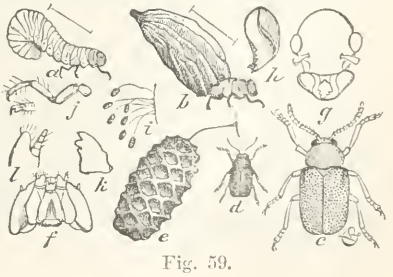


Fig. 59.

Coscinoptera dominicana, Fab., the Dominican case-bearer, is a cylindrical beetle, nearly one-fourth of an inch long, and is well represented in all its stages in Fig. 59 (after Riley). In the figure, *a*, shows the larva extracted from its case; *b*, the same dragging its case, which is composed of chewed fragments of leaves; *c*, beetle enlarged to show

punctures; *d*, same natural size; *e*, the egg enlarged; *f*, head of larva, underside; *g*, head of male beetle; *h*, jaw of same; *i*, eggs natural size, showing the curious manner in which they are attached to leaves; *j*, leg of larva; *k*, jaw of same; *l*, maxillæ of same.

The genus Chlamys contains beetles differing greatly in general appearance from those previously described. They are short and thick set, resembling when at rest dried buds or bits of bark on account of their curiously knobbed and wrinkled elytra and thorax. The larva (Fig 60) like that of the preceding species constructs for itself a sac which it bears about with it while feeding on the leaves, like a snail carries its shell. The larva (figure *a*) is a small stout grub, having the posterior end recurved in the sac, from which the head and legs protrude. The case is composed of small pellets of vegetable matter.

Fig. 60.

Chlamys plicata, Fab., "is a little oblong, cubical, roughly shagreened, metallic greenish beetle, found in abundance upon leaves southward." A variety known as *C. polycocca*, Lac., is found here in June, and is of a dull brown or coppery colour.

Monachus saponatus, Fab., is an almost globular steel-blue beetle, one-tenth of an inch long, taken upon alders and plants growing in low woods and meadows.

The genus Cryptocephalus contains a great number of small cylindrical beetles, having the head withdrawn in the thorax, whence the generic name signifying "buried head." The larvæ, like those of Coscinoptera and Chlamys, are case-bearers.

C. maculatus, Say, is a bluish-black beetle, one fifth of an inch long, with an orange-red spot on the tip and shoulder of each wing-cover. They are abundant throughout the summer on pines, and less frequent on other trees.

C. luteipennis Mels., is a smaller species, having orange wing-covers, which is very abundant upon willows.

Pachybrachus is another extensive genus of small cylindrical beetles, having the head less retracted within the thorax. *P. tridens*, Mels., prettily mottled with yellow and brown; appears in numbers upon willows.

Another beetle frequently found upon willows is *Adoxus vitis*, Linn., a black insect of robust form, and about one-fourth of an inch long; the elytra are a dark reddish-brown. The word *vitis* being the Latin for vine, this beetle may, perhaps, be found upon grape-vines, although I do not remember to have seen any statement to that effect.

The next member, under present classification, of the Chrysomelidæ is *Fidia viticida*, Walsh, the Grape-vine Fidia (Fig. 61), which also derives its name from the same source. It is slightly longer than the preceding species, but of very similar shape; its colour is chestnut-brown, and it is covered with short whitish hairs, giving to it a hoary appearance. It is very injurious to grape-vine leaves in the Western States, riddling them with large holes, and when numerous reducing them to mere shreds.

Fig. 61.

Glyptoscelis pubescens, Fab. (*hirtus*, Oliv.), is a coppery, and, as its name denotes, pubescent or hairy beetle, the hairs not being very close. It is one third of an inch long, and appears upon the leaves of pines in May and June.

Upon Dog's-bane and Indian hemp, about the end of July, may be found numbers of a very beautiful beetle named *Chrysochus auratus*, Fab., both names signifying golden. Its colour is a brilliant green, when seen in a dull light, but when crawling upon the plants under a bright sun the colours are irridescent, and they appear like rubies and emeralds upon the leaves.

Paria aterrima, Oliv., common here upon different plants, is said by Prof. J. A. Cook (Michigan) to be very destructive to strawberries, for though small they are so numerous and voracious as often to defoliate the plants. The larvæ are white, with yellowish heads and brown jaws, are about one-fifth of an inch long, and transform in a small, spherical, earthern cocoon. The beetle is about one-eighth of an inch long, and varies in colour, some being all black, while others—perhaps the greater number—have the head, antennæ, legs and wing-covers yellowish, the latter having each two black spots. They may be destroyed by applications of Paris green or London purple, but these poisons should not be used after the berries have formed.

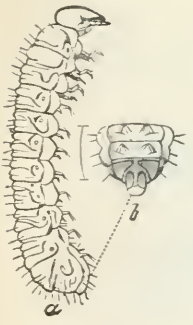


Fig. 62.

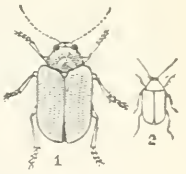


Fig. 63.

One of our allied beetles, *Colaspis flavida*, Say., feeds also in the larval state upon the rootlets of the strawberry. Fig. 62 represents the larva, Fig. 63 the mature insect.

We now come to the extensive genus Chrysomela (golden apples), which contains our largest beetles of this family. The most generally known, as well as the most generally hated of these is *C. decem-lineata*, Say, the ten-lined chrysomela, or as it is more commonly called the Colorado potato beetle. This insect has already been described and frequently mentioned in our Reports, and its appearance and habits are so well known to all agriculturists that only a very brief account of it must be given here. Over sixty years ago, in 1819 or 1820, it was discovered by Say along the Upper Missouri, near the base of the Rocky Mountains, where it fed upon Solanum rostratum, a wild plant belonging to the same genus as the cultivated potato (Solanum tuberosum). Its discoverer had probably no idea that at some future day it would so far extend its range and prove so noxious an insect, but as the country became settled it was found transferring itself to the potato fields, where it obtained a more abundant and constant supply of food, and where it increased in numbers proportionately. By 1861 the beetles had become so numerous in Kansas that over two bushels of them were gathered in one garden. During the last twenty years they have rapidly extended their range eastward, and in the past summer they have been reported from Nova Scotia. While they still cause much trouble and a certain amount of loss to pototo growers, they are no longer feared as they were when their ravages were first made known. Paris green and London purple, when properly applied, have proved efficient destroyers, while planting early ripening species of potatoes, ensures their maturing before the beetles become numerous enough to do much injury to them. Gradually also insect enemies have increased in kind and number, among which may be named *Podispus spinosus*, Dallas, the (Spined Soldier-Bug, Fig. 64); *Perrillus circumcinctus*, Say (the Belted Soldier-Bug, Fig. 65); *Harpactor cinctus*, Fab. (the Many-banded Robber-bug, Fig. 66); *Lydella doryphoræ*,

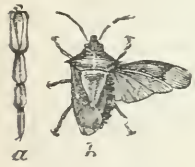


Fig. 64.

Fig. 65.

Fig. 66.

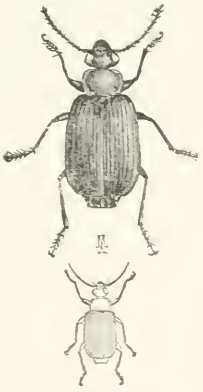


Fig. 67.

Riley, a two-winged fly, of which the larvæ are parasitic in the grubs of the beetle; *Lebia grandis*, Hentz (Fig. 67, where it is shown magnified, and also of the natural size): and other beetles belonging to the Carabidæ, and several species of Lady-birds (Coccinellidæ), of which the largest is *Mysia 15-punctata*, Oliv. (Fig. 68). Notwithstanding the aid thus rendered to man it will be a very long time before the beetles are so far exterminated as to be rarities. The patches of yellow eggs upon the leaves, the loathsome yellowish-red, black-spotted larvæ destroying the tops, and the beetles crawling in striped yellow and black

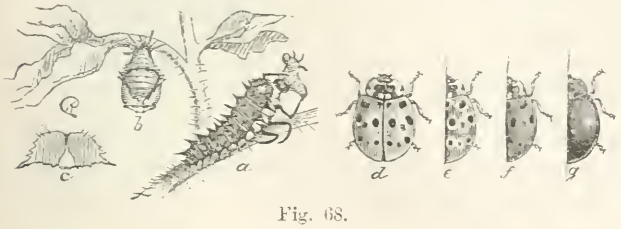


Fig. 68.

jackets about the fences and roads, or sailing with pink wings through the air, will long be familiar objects. Fig. 69 shows this insect in it several stages—*a*, the eggs ; *b*, *b*, *b*, the larvæ at different periods of growth ; *c*, the pupa ; *d*, *d*, the beetle natural size ; *e*, a wing-cover much enlarged.

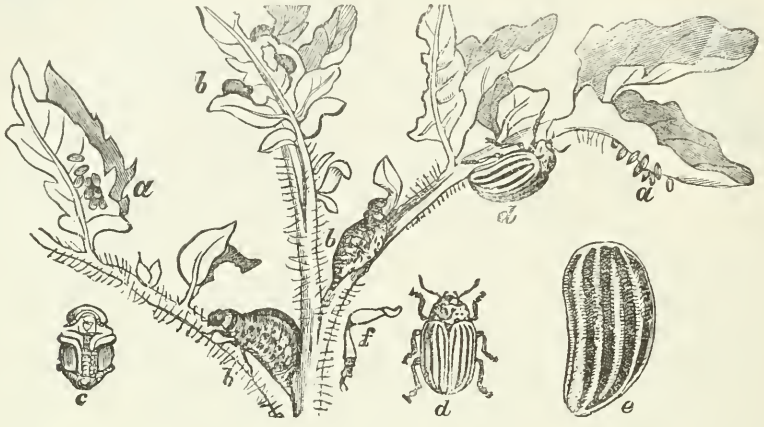


Fig. 69.

C. clivicollis, Kirby (*Labidomera trimaculata*, Fab.), is a handsome beetle, about the size of the preceding species, found upon the common milk-weed during the autumn. It is of an oval, rounded-convex shape, and of a deep bluish-green or greenish-black colour, the feet being purplish. The elytra are orange, with a broad bluish band across the back and a large bluish spot near the tip. The markings vary greatly in outline, and the band is often interrupted so as to form two irregular spots on each wing-cover.

C. multiguttata, Stal., (*Scalaris*, Lec.), is a somewhat smaller beetle, varying in size, found throughout the season on various trees, as the elm, the linden, and especially the willows and alders. Its eggs are laid on the underside of the leaves. The larvæ are short, stout grubs, about half an inch long, whitish, with a black line along the top of the rounded back, and a row of black spots on each side of the body. The beetle is greenish, with yellowish legs and antennæ ; the elytra are yellowish with many green dots varying in shape, and a broad band runs down the back where they meet, and gives off three or four branches on each side, forming as it were steps, whence the name *Scalaris* from a Latin word meaning a ladder. There are said to be two broods, the first in April, May, and June, and the second in September and October. A very beautiful variety of this species (*C labyrinthica*, Lec.) is sometimes found, which differs so much in colouration as to seem a distinct species ; it also appears to be slightly larger. The body of the beetle is of a deep black, with a slight bluish tinge, as are also the legs and antennæ. The elytra have a jagged, irregular border of white, and there are two rows of four white spots upon the back. The margin and spots vary, however, in different specimens, and are more or less joined together. I captured several specimens in 1878, but did not meet with it again until I took one last summer.

C. philadelphica, Linn., is a smaller bettle of very similar appearance to *C. multiguttata*, which feeds upon pine leaves in May and June.

C. elegans, Oliv., is, as its name implies, an elegant little bettle one-fourth of an inch long, which appears very early in spring, is abundant for a couple of months, and is occasionally taken late in the autumn. It is a black beetle with white or yellowish stripes upon the wing-covers. Although so common I have as yet been unable to determine upon what it feeds.

Gastrophysa polygoni, Linn., is a small bettle, one-fifth of an inch long ; very abundant all summer, and remarkable for the manner in which the abdomen of the gravid female is distended with eggs. The head is blue-black, the thorax and legs are rufous, and the elytra are a brilliant and metallic blue.

Plagiodera lapponica, Linn., is more elongated and flattened than species of the genus Chrysomela. It is one-fourth of an inch long; black; the elytra, orange with black spots, and is found upon alders and willows. The larva is of a dingy yellowish-white colour, with black head and legs. Upon the sides and back are rows of small dusky tubercles; the outer-dorsal rows being more distinct and capable of emitting from their tips a milky, pungent fluid.

P. Scripta, Fab., a very closely allied species, (by some held to be but a variety of the last) has proved itself a very destructive insect in the Western States; especially in the prairie regions, where it has become a grievous pest on account of its depredations on the cottonwood. This tree is grown very extensively as a shade and ornamental tree, and for fuel, and vast groves are stated to have been utterly destroyed by repeated defoliations. The eggs are laid in clusters, of from ten to one hundred, on the young leaves in the spring and quickly develop. There are two or three broods during the summer.

Monocesta coryli, Say., (corylus being the latin for a hazel, or filbert tree,) is known in the United States as the Great Elm-leaf Beetle, and is occasionaly very destructive to the red or slippery elm. Its eggs are laid on the under side of the leaves in June, and from them issue in a few days brown, or yellowish brown larvæ, which, growing rapidly, "eat the leaves into rags." About the end of July they enter the ground and pupate.

The genus Diabrotica contains a number of species, of which *D. vittata*, Fab., the Striped Cucumber Beetle, is a well-known gardener's pest. It was well figured and described in the Report of 1878. The little lemon-yellow bettle (Fig. 70), with a black head and three black stripes on the wing-covers, makes its appearance as cucumbers, squashes and melons commence to show above ground. It feeds upon the young leaves, and at the same time deposits its eggs near the roots of the young vines. From these hatch out slender white grubs having small brownish heads, and slim, pale-brown thoracic legs. Burrowing into the stems just below the surface of the ground (the plants being thereby weakened and often destroyed), the larva reaches maturity in about a month from the deposition of the egg, and is then one-third of an inch long. Leaving the plant it pupates in a little cell in the earth, and emerges after a couple of weeks as a beetle, which feeds upon the young shoots and buds. There are two or three broods during the season, the last remaining in the ground all winter as pupæ. An effective, and not expensive, method of protecting the young plants is to cover them with wooden frames having gauze tops.

Fig. 70.

A larger but less common species is that known as *D. 12-punctata*, Oliv., or Twelve-Spotted Diabrotica, which derives its name from twelve black spots upon the elytra (Fig. 71). It is stated by Packard to be injurious to the leaves of the dahlia.

Fig. 71.

Within the past few years a beetle belonging to this genus, and closely allied to our cucumber beetle, has become noted in Illinois, Missouri and other Western States as a corn pest. The larvæ of *D. longicornis*, Say, the Long-horned Diabrotica, are very similar in size and appearance to those of our cucumber beetle, and feed on and in the roots of the young corn-plants, causing them to wither and die. The beetle is of a uniform pale greenish-yellow, without any markings. The application of lime and ashes around the young corn is proposed as a preventative.

Several species of the genera Galeruca and Galerucella are found in Canada, they are similar in form to Diabrotica, but, generally a little smaller and of a darker colour. *Galeruca rufosanguinea*, Say, is well described by its specific name which means blood-red. It is one-fifth of an inch long and is found upon various trees. Last June it was abundant on choke-cherry.

Galerucella marginella, Kirby, has been described by Packard as found in all its stages upon Myrica gale in August. The larva is shining black and the beetle closely resembles the following species, except in being darker.

G. xanthomelina, Schr., (the imported elm beetle) is said to feed upon the elm in such numbers as often to wholly defoliate the trees. In 1879, the elms of Newburg, N. Y., a town celebrated for its fine avenues of this handsome tree, were almost stripped by these beetles. The larvæ are thick, cylindrical, blackish grubs, producing greyish-yellow beetles distinguished by three black dots on the thorax, and a black stripe on the outer edge of the elytron.

G. sagittariæ, Kirby, is a dark brownish species (with the exception of a yellowish line around the margin of the wing-covers), which I have found about the middle of September abundant upon the leaves of the water-lily, in the larval, pupal, and perfect stages. It is also given by Packard as occurring upon the willow.

We now come to a large group consisting of several genera of small—often minute—beetles having the thighs of the hind pair of legs much enlarged and very powerful, by which the beetles are enabled to jump a great distance (in proportion to their size) when disturbed. From this characteristic they are known as Halticas, or Flea-beetles.

The genus Oedionychis contains a number of species, of which *O. quercata*, Fab., is a common one. It is a dark bettle, of oval form and variable markings. Its name associates it with the white oak, and it is found upon other trees as well.

Another extensive genus is Disonycha which contains some of our handsomest Flea-beetles. *D. glabrata*, Fab., a pretty little beetle with yellow and black striped wing-covers; *D. collaris*, Fab., a bluish-black beetle with a red thorax, and *D. triangularis*, Say, closely resembling the latter, except that it bears three black dots upon the yellowish thorax, may be found in October sheltering themselves under cornices of buildings, or in crevices, etc. They may also be found early in spring under stones, loose bark, etc., where they have hibernated. *D. alternata*, Ill., a large handsome species is rare here.

Graptodera chalybea, Ill., is well known to grape growers as the Grape-vine Flea-beetle. In some seasons it is very abundant, and inflicts a considerable amount of injury. The greatest loss is caused by such beetles as have hibernated under loose bark, fallen leaves, and stones, or in crevices, outbuildings, or other refuges from cold, and which appearing early in April bore into and feed upon the bursting buds. Afterward they feed upon the young leaves, on which during May the female deposits clusters of small orange eggs. Soon hatching, the little dark-coloured larvæ (Fig. 72 *a*), proceed to riddle the leaf, and when very numerous may completely devour it; *b*, shows one enlarged, the faint line indicates the natural length. At the end of a month the larva descends from the vine and pupates in a small earthern cell (Fig. 72, *c*), from which the beetle (*d*, enlarged) emerges about three weeks later. It then feeds upon the leaves, but does, however, comparatively trifling damage. Such beetles as do not fall a prey to various enemies seek, on the approach of cold weather, a sheltered retreat in which to spend the winter. There is only one brood each summer. The best method of checking their ravages is to collect them (as proposed by Mr. L. O. Howard, Asst.-Entomologist to Department Agriculture, Washington) upon sheets drenched with coal oil.

Fig. 72.

Phyllotreta vittata, Fab. (*Haltica striolata*, Ill.) the Striped Turnip-flea-beetle is one of our very commonest insects. It may be found at any time during the season, from the first mild days of spring until the end of October. During the earlier months it appears in swarms upon various plants, and upon fences, etc. The larva (Fig. 73, *a*) is a slender white grub, one-third of an inch long, feeding upon roots underground, where, in a little earthern cell, it changes to a naked white pupa (*b*). About a fortnight later it emerges as a little black beetle (also shown in Fig. 73), less than one-tenth of an inch long, but readily determined by the waved, yellowish or reddish stripe on each wing-cover, the stripe sometimes being interrupted so as to form two spots. The beetles feed upon the seed-leaves of turnips and cabbages, as well as upon other veget-

Fig. 73.

ables, and are thus very injurious; while the plants are also weakened and killed by the larvæ feeding upon the roots. In England there are several allied species very destructive to turnips, but the larvæ mine in the leaves instead of feeding upon the roots.

Systena marginalis, Ill., a slender, yellowish beetle, one-fifth of an inch long, with a narrow black line down the sides, is often very common upon elms, hickory, etc. I found them especially adundant last season late in September upon some small oaks, the leaves of which were much eaten. The beetles were at this time nearly all paired, and were much more sluggish than they were three weeks previously, when I had noticed a great number on some sweet-hickories.

Epitrix cucumeris, Harris, the Cucumber Flea-beetle, is about the size of the turnip beetle above described, and of similar habits, except that the larvæ mine the leaves of the plants. The beetles (Fig. 74) are about one line in length, are black, with yellowish antennæ and legs, and have the elytra roughly punctured. They feed upon the seed-leaves of cucumbers, thus killing the young vines, and are found throughout the summer upon turnips and various garden vegetables, eating holes in the leaves.

Fig. 74.

There are a great number of small species belonging to the above and allied genera, of very similar habits, and often injurious to cultivated as well as to wild plants. During the winter such specimens as are to perpetuate the race seek refuge in crannies and crevices of walls and fences, under stones or loosened bark, in tufts of moss, among fallen leaves, in hollow stems of plants, etc. There, sheltered from the wet, they withstand the severe frosts of our long winters, and come forth in the first warm days of spring to renew their depredations. In the interval between their awakening and the appearance of the cultivated vegetables upon which they feed, they subsist upon various species of wild plants. We thus see, in regard to these insects as well as to many others, the evils which may result to crops from leaving rubbish heaps and neglected corners about the fields for insects to winter in, or to obtain sustenance in the early season. Of course numbers of them hibernate in waste and wooded tracts, whence they invade the fields and gardens in spite of every care; still it will pay to keep gardens and fields free from stone and rubbish heaps, from strips of weeds and brambles along the fences, and neglected spots of any kind.

Odontota (Hispa) rosea, Web., is very different in appearance from the previously described species, not having their oval or rounded shape. The wing-covers are truncated posteriorly, instead of being rounded off, and form a parallelogram, to the anterior end of which is applied the base of the triangle formed by the tapering thorax and small head. The short stout antennæ project in the form of a V. The beetle, about one-fifth of an inch long, is of a tawny-reddish colour above, with irregular darker spots and lines upon the elytra, the legs are yellow. Each wing-cover has three raised lines, with the intervening spaces deeply punctured. The larvæ mine in the leaves of various trees, those of the apple among others, and are, when full-grown, about one-fourth of an inch long. They pupate in the leaves, and about a week afterward the beetles come forth from their mines, and may be found upon oaks, hawthorns, etc. There is a smaller and darker variety of this species, of which I took several specimens last season on elms.

Chelimorpha argus, Licht. (*Cribraria*, Fab.), is an interesting beetle, and is among the largest of our Chrysomelidæ. Some specimens appear nearly as large as potato beetles, but they are not nearly so stoutly built. They are known as tortoise beetles from the great resemblance they bear in figure to those reptiles. The sides of the thorax are flattened, and project so as to hide the head, while the ample elytra also entirely hide the body. The under surface of the body, and the legs are black, but the thorax and elytra are ochraceous-yellow, the former having six small black dots, the latter fifteen, varying in size. The beetle feeds upon various plants. Packard mentions it as "found in all its stages on the leaves of the milk-weed late in July and early in August, and in one instance it occurred in abundance on the leaves of the raspberry." It feeds here upon convolvulus very frequently. The larva is a broad and thick yellow grub, three-fourths of an inch long, and partially covered by its cast larval-skin. The pupa (attached to a leaf) is more broad and flattened; it is of a dark colour, but covered with a whitish powder. Two stout spines project from each side of the thorax, and five smaller ones from each side of the abdomen.

The family of the Chrysomelidæ terminates with the Cassidiidæ, a group of beetles deriving their name from the Latin word cassida, a helmet, and they are commonly known as Helmet beetles, from their fancied resemblance to that portion of a warrior's armour. Some of the species are very beautiful, the colours being delicate and brilliant. The wing-covers and the sides of the thorax protrude so as to entirely cover the legs and head when the beetle is at rest, but the margins are so thin as to be quite transparent.

Coptocycla (Cassida) aurichalcea, Fab., the Yellow Helmet beetle, is often found upon morning glories, and is shield shaped, and of a beautiful golden-yellow colour. The larvæ feed upon the leaves of the morning glory, and are of a broad, oval, flattened form. The tip of the abdomen is armed with two diverging spines, forming a fork, with which the larva heaps upon its back, as a protective covering, its excrement and cast larval skins.

We have now hastily reviewed this large and interesting family, as represented in Canada, and endeavoured to describe the appearance and habits of some of the more common of the species. Much, however, remains to be learnt in connection with the life-histories of many of the species. A few beetles have also been mentioned which may not have yet reached this country, but which have proved troublesome in the United States within recent years.

NOTES OF THE YEAR.

By Wm. Saunders, London, Ont.

The Grape Phylloxera.

Phylloxera Vastatrix.—This tiny but formidable foe to the grape vine, which has during the past few years attracted so much attention in Europe and America, has appeared in its worst form, viz.: the root-inhabiting type, in Ontario, and is doing a considerable amount of damage in our vineyards. Early this spring the writer received from Mr. A. H. Pettit, of Grimsby, samples of fibrous roots from diseased vines, which had every appearance of being affected by the Phylloxera, but the specimens were so dried up that if there had been any lice on them they could not be discovered. Request was made for fresh specimens in moist earth, but none were obtained.

On the 19th of July, in company with Mr. J. M. Denton, of London, I visited the vinery of Mr. Richard Stephens, in Westminster, about a mile from London, where we found a number of Concord vines growing in heavy clay soil, which were suffering much from some cause ; the foliage had become very yellow and some of the vines appeared to be dying. On examining the roots, we could find but few living, and the fibrous roots were covered with the little knotted swellings so characteristic of Phylloxera. On digging around some vines that were less diseased, a number of the lice were discovered on the young, fresh roots, puncturing them, imbibing their juices, and causing disease and death.

On the following day, another vinery was visited, near London, where the vines were planted on sandy soil, when the same form of Phylloxera was detected on Rogers 15 and some seedling grapes, but, in this instance, the disease was much less pronounced. On examining the roots of these vines, the insects were found in the egg state, and also as larvæ of various sizes in comparative abundance. In the vinery of Mr. Stephens' the insects must have been at work for several years past, to have caused the extent of injury which we saw ; but, in the other case, the invasion appeared to be a more recent one. It was gratifying to find, on Mr. Stephens' grounds, a very active, friendly insect, a small mite *Tyroglyphus phylloxera* which feeds upon the Phylloxera, busy at work on its useful mission.

Since this insect is now known to be at work in Ontario, and probably to a greater extent than we are at present aware of, a condensed account of its life history will probably be interesting to our readers. The figures are from Prof. Riley's excellent reports, and the facts given, mainly gleaned from the writings of this and other authors.

Its progress in Europe has been most alarming, inflicting untold losses in the wine-making districts. The destruction it has occasioned in France has been so great that it has become a national calamity which the Government has appointed special agents to inquire into; large sums of money have also been offered as prizes to be given to any one who shall discover an efficient remedy for this insect pest. At the same time it has made alarming progress in Portugal, also in Switzerland and some parts of Germany, and among vines under glass in England. It is a native of America, from whence it has doubtless been carried to France; it is common throughout the greater portion of the United States, and in one of its forms in Canada, but our native grape vines seem to endure the attacks of the insects much better than do those of Europe. Recently it has appeared on the Pacific slope in the fertile vineyards of California, where the European varieties are largely cultivated, and hence its introduction there will probably prove disastrous to grape culture. Already many vineyards are seriously affected, and it is said that some grape growers have had to root up hundreds of vines and destroy them, in consequence of the roots being so crowded with the lice. After the sad experience of European vineyardists it is not surprising that the grape-growers of California are much exercised over this subject. The phylloxera has also occurred in several of the Southern States.

This insect is found in two different forms: in one instance, on the leaf, where it produces greenish red or yellow galls of various shapes and sizes, and is known as the type *Gallaecola*, or gall-inhabiting; in the other and more destructive form, on the root, known as the type *Radicicola*, or root-inhabiting, causing at first, swellings on the young rootlets, followed by decay, which gradually extends to the larger roots as the insects congregate upon them. These two forms will, for convenience, be treated together.

The first reference made to the gall-producing form was by Dr. Fitch, in 1854, in the Transactions of the New York State Agricultural Society, where he described it under the name of *Pemphigus vitifoliæ*. Early in June there appear upon the vine leaves small globular or cup-shaped galls of varying sizes; a section of one of these is shown at *d*, figure 76; they are of a greenish red or yellow colour, with their outer surface somewhat uneven and woolly. Figure 75 represents a leaf badly infested with these galls. On opening one of the freshly formed galls, it will be found to contain from one to four orange-coloured lice, many very minute shining, oval, whitish eggs, and usually a considerable number of young lice, not much larger than the eggs, and of the same whitish colour. Soon the gall becomes overpopulated, and the surplus lice wander off through its partly opened mouth on the upper side of the leaf, and establish themselves either on the same leaf or on adjoing young leaves, where the irritation occasioned by their punctures causes the formation of new galls, within which the lice remain. After a time the older lice die, and the galls which they have inhabited open out and gradually become flattened and almost obliterated; hence it may thus happen that the galls on the older leaves on a vine will be empty, while those on the younger ones are swarming with occupants.

Fig. 75

These galls are very common on the Clinton grape and other varieties of the same type, and are also found to a greater or less extent on most other cultivated sorts. They sometimes occur in such abundance as to cause the leaves to turn brown and drop to the ground, and instances are recorded where many vines have been defoliated from this cause. The thin leaved varieties of grape suffer most, those with thick leathery foliage being seldom injured to any considerable extent. Such varieties as Concord, Hartford Prolific, Moore's Early, and Rogers' Hybrids

are rarely injured by this leaf-inhabiting form of the insect. The number of eggs in a single gall will vary from fifty to four or five hundred, according to the size of it; there are several generations of the lice during the season, and they continue to extend the sphere of their operations during the greater part of the summer. Late in the season, as the leaves become less succulent, the lice seek other quarters and many of them find their way to the roots of the vines, and there establish themselves on the smaller rootlets. By the end of September, the galls are usually deserted. In figure 74 we have this type of the insect illustrated; *a* shows a front view of the young louse, and *b* a back view of the same; *c* the egg, *d* a section of one of the galls, *e* a swollen tendril; *f*, *g*, *h*, mature egg-bearing gall lice, lateral, dorsal, and ventral views; *i*, antenna, and *j* the two-jointed tarsus.

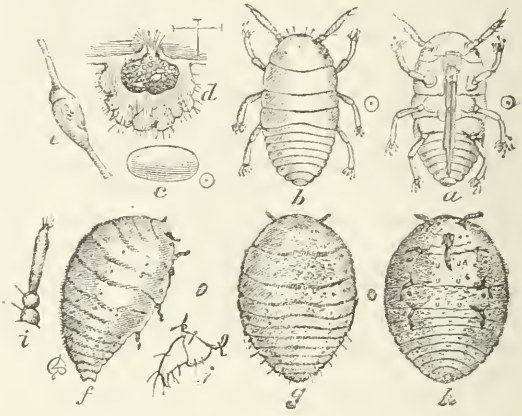


Fig. 76.

When on the roots, the lice subsist also by suction, and their punctures result in abnormal swellings on the young rootlets, as shown at *a* in figure 77. These eventually decay, and this decay is not confined to the swollen portions, but involves the adjacent tissue, and thus the insects are induced to betake themselves to fresh portions of the living roots, until at last the larger ones become involved, and they, too, literally waste away.

In figure 77 we have the root-inhabiting type, *Radicicola*, illustrated: *a*, roots of Clinton vine, showing swellings; *b*, young louse as it appears when hibernating; *c*, *d*, antenna and leg of same; *e*, *f*, *g*, represent the more mature lice. It is also further illustrated in fig. 78, where *a* shows a healthy root, *b* one on which the lice are working, *c* root which is decaying and has been deserted by them; *d d d* indicates how the lice are found on the larger roots; *e*, female pupa, seen from above; *f*, the same from below; *g*, winged female, dorsal view; *h*, the same, ventral view; *i*, the antenna of the winged insect; *j*, wingless female laying eggs on the roots, while *k* indicates how the punctures of the lice cause the larger roots to rot. Most of these figures are highly magnified; the short lines or dots at the side showing the natural size.

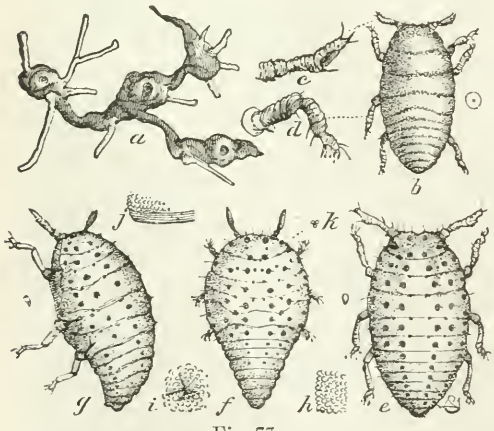


Fig. 77.

During the first year of the insect's presence the outward manifestations of the disease are very slight, although the fibrous roots may at this time be covered with the little swellings; but if the attack is severe, the second year the leaves assume a sickly yellowish cast, and the usual vigorous yearly growth of cane is much reduced. This is not to be wondered at when we consider the immense number of tiny mouths which are busily at work in all directions sucking the sap and thus depriving the leaves of their only means of subsistence. After a time the vine becomes more debilitated and eventually dies, but before this takes place, the lice, having little or no healthy tissues to work on, cannot find sufficient sap for their sustenance, hence they leave the dying vine and seek for food elsewhere—either wandering about under the ground among the interlacing roots of adjacent vines, or crawling over the surface in search of more

healthy material to feed on. During the winter many of them remain torpid, and at that season assume a dull brownish colour, so like that of the roots to which they are attached that they are difficult to discover. They have then the appearance shown at *b* in figure 77. With the renewal of growth in the spring, the young lice cast their coats, rapidly increase in size, and appear as shown at *e*, *f*, *g*, in the figure ; soon they begin to deposit eggs, these eggs hatch, and the young shortly become also egg-laying mothers like the first, and like them also remain wingless. After several generations of these egg-bearing lice have been produced, a number of individuals about the middle of summer acquire wings. These also, are all females, and they issue from the ground, and rising in the air, fly or are carried with the wind to neighbouring vineyards, where they deposit eggs on the underside of the leaves among their downy hairs, beneath the loosened bark of the branches and trunk, or in crevices of the ground about the base of the vine. Occasionally individual root lice abandon their underground habits and form galls on the leaves.

The complete life history of this insect is very curious and interesting, but would occupy too much space to fully detail here. Those desirous of pursuing this portion of the subject further, and of informing themselves as to the different modifications of form assumed by this insect in the course of its development will find the desired information given with much minuteness of detail in the 5th, 6th, 7th and 8th Reports on the Insects of Missouri, by C. V. Riley.

Remedies : This is an extremely difficult insect to subdue, and various means for the purpose have been suggested, none of which appear to be entirely satisfactory. Flooding the vineyards where practicable seems to be more successful than any other measure, but the submergence must be total and prolonged to the extent of from twenty-five to

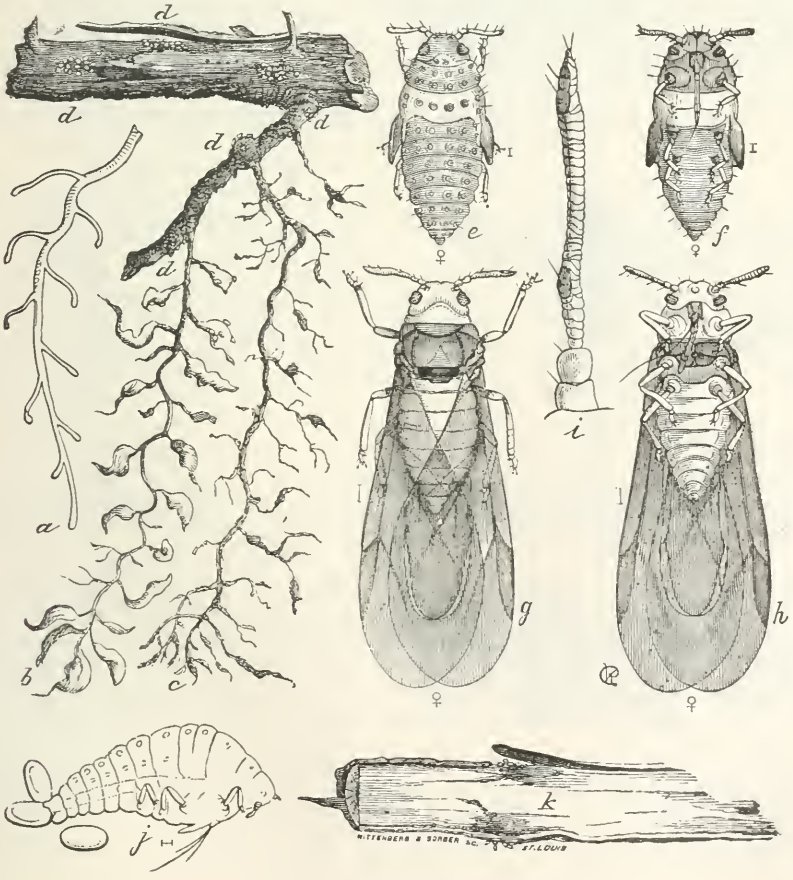


Fig. 78.

thirty days ; it should be undertaken in September or October, when it is said that the root lice will be drowned, and the vines come out uninjured.

Bisulphide of carbon is claimed by some to be an efficient remedy ; it is introduced into the soil by means of an augur with a hollow shank, into which this liquid is poured ; several holes are made about each vine, and two or three ounces of the liquid poured into each hole. Being extremely offensive in odor and very volatile, its vapour penetrates the soil in every direction, and is said to kill the lice without injuring the vines. This substance should be handled with caution, as its vapour is very inflammable and explosive. Carbolic acid mixed with water, in the proportion of one part of acid to fifty or one hundred parts of water, has also been used with advantage, poured into two or three holes made around the base of each vine with an iron bar to the depth of a foot or more. Soot is also recommended, to be strewed around the vines.

It is stated that the insect is less injurious to vines grown on sandy soil ; also to those grown on lands impregnated with salt.

Since large numbers of these insects, both winged and wingless, are known to crawl over the surface of the ground in August and September, it has been suggested to sprinkle the ground about the vines at this period with quicklime, ashes, sulphur, salt or other substances destructive to insect life. The application of fertilizers rich in potash and ammonia have been found useful, such as ashes mixed with stable manure or sal-ammoniac.

A simple remedy for the gall-inhabiting type is to pluck the leaves as soon as they show signs of the galls, and destroy them.

Several species of predaceous insects prey on this louse. A black species of Thrips with white fringed wings deposits its eggs within the gall, which, when hatched, produce larvæ of a blood red colour, which play sad havoc among the lice. The larva of a Syrphus fly, *Pipiza radicum*, which feeds on the root louse of the apple, see figure 79, has also been found attacking the Phylloxera. Another useful friend is a small mite, *Tyroglyphus phylloxera*, P. & R., see (Fig. 80), which attacks and destroys the lice, and

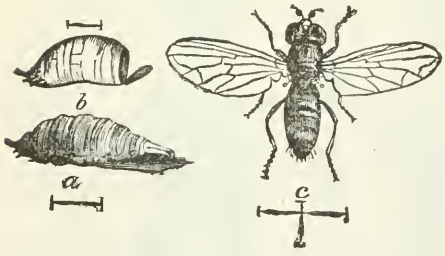


Fig. 79.

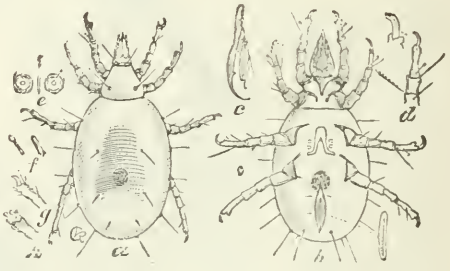


Fig. 80.

associated with this is sometimes found another species, *Holophora arctata*, Riley, of a very curious form, reminding one of a mussel. In (Fig. 81), this minute friend is represented highly magnified in the different forms assumed by it.

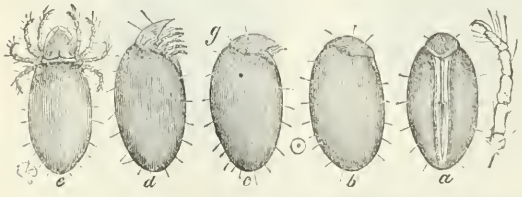


Fig. 81.

These lice are also preyed on by the larvæ of a Scymnus, a small dull coloured lady bird ; also by several other species of the lady-bird family, and by the larvæ of lace-wing flies.

To guard against its introduction into new vineyards, the roots of young vines should be carefully examined before planting, and if knots and lice are found upon them, these latter may be destroyed by immersing the roots in hot soap suds or tobacco water.

Our native American vines are found to withstand the attacks of this insect much better than do those of European origin, hence by grafting the more susceptible varieties

on these hardier sorts, the ill-effects produced by the lice may in some measure be counteracted. The roots recommended to be used as stocks are those of Concord, Clinton, Herbemont, Cunningham, Norton's Virginia, Rentz, Cynthiana, and Taylor. The Clinton, one of the varieties recommended, is particularly liable to the attacks of the gall-producing type of Phylloxera, but the lice are seldom found to any great extent on its roots, and the vine is so vigorous a grower that a slight attack would not produce any perceptible effects.

The Grape Berry Moth—Lobesia botana.

This is another grape pest which has appeared in our midst of late and promises to be a troublesome insect to contend with. It is an imported species, one which has long been injurious to grape culture in the south of Europe. The exact period of its introduction to America is not known, and it is only within the past few years that attention has been called to its ravages. When abundant it is very destructive ; in some instances it is said to have destroyed nearly fifty per cent. of the crop.

During the past season it has been very abundant in the neighbourhood of London, there being very few vines the fruit of which has not been more or less injured. The young larvæ have usually been first observed early in July, when the infested grapes show a discoloured spot where the worm has entered. See (Fig. 82 c). When the grape is opened and the contents carefully examined there will usually be found in the pulp a small larva rather long and thin, and of a whitish green colour. Besides feeding on the pulp it sometimes eats portions of the seeds, and if the contents of a single berry are not sufficient, two, three, or more are drawn together as shown in the figure and fastened with a patch of silk mixed with castings, when the larva travels from one to the other, eating into them and devouring their juicy contents. At this period its length is about an eighth of an inch or more ; the head is black and the next segment has a blackish shield covering most of its upper portion ; the body is dull whitish or yellowish green. As it approaches maturity it becomes darker in colour and when about one-third of an inch long is full grown, see *b*, figure 82. The body is then dull green with a reddish tinge and a few short hairs, head yellowish green, shield on next segment dark brown, feet blackish, pro-legs green.

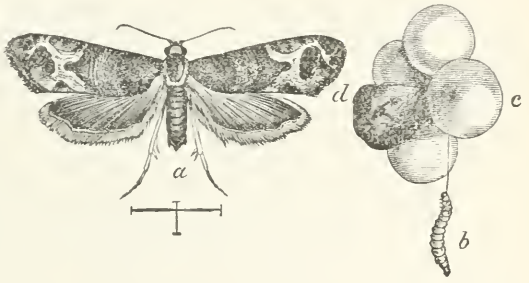


Fig. 82.

When the larvæ is full grown it is said to form its cocoon on the leaves of the vine, cutting out for this purpose an oval flap, which is turned back on the leaf forming a snug enclosure which it lines with silk ; frequently it contents itself with rolling over a piece of the edge of the leaf, and within such retreats the change to a chrysalis takes place. The chrysalis is about one-fifth of an inch long and of a yellowish or yellowish brown colour, from which the moth finally escapes.

The perfect insect which is shown magnified, *a*, figure 21, measures when its wings are spread nearly four-tenths of inch across. The fore-wings are of a pale, dull bluish shade with a slight metallic lustre, becoming lighter on the interior and posterior portions, and ornamented with dark brown bands and spots. The hind wings are dull brown, deeper in colour towards the margin, body greenish brown. It is said that there are two broods of this insect during the year. We have never seen them at any other time than in the autumn when the grapes are approaching maturity.

Remedies—As it is probable the most of the late brood pass the winter in the chrysalis state attached to the leaves, if these were gathered and burned a large number of the insects would perish. The infested grapes might also be gathered and destroyed. This insect is attacked by a small parasite which doubtless does its part towards keeping the enemy in subjection.

The Clover Seed Midge—Cecidomyia leguminicola.

This new insect pest to which we refered at some length in the Report for last year, seems to be rapidly spreading. It has destroyed a considerable portion of the seed grown in the neighbourhood of London, an injury felt this year more than it would usually be on account of the light crop, resulting from an unfavourable season.

As stated last year, this insect is no doubt being spread by the dissemination of infested clover seed. The larva is very small, not more than one-hundredth of an inch long, and of a reddish or orange-red colour. When the seed is threshed these larvæ are mixed with it, and they remain in the larval condition all winter with the seed, and are sown with the seed in the spring. Once in the ground the insect finds all the conditions necessary for its full development, and before long it issues as a fly and enters on its work of destruction, producing two broods during a year. Farmers should exercise caution in the selection of their seed ; and seedmen should carefully examine the seed they sell, otherwise they may seriously injure the prospects of their customers by introducing and disseminating this pest in districts hitherto free from it.

The Hessian Fly—Cecidomyia destructor Say.

On 26th of July last, my attention was called to the wheat growing in the neighbourhood of London by one of our most intelligent and successful farmers, Mr. John Wallis, of lot 32, con. 4, London township, who had found evidences in his own fields of injury caused by an insect, which, on examination, proved to be the Hessian Fly. I at once called general attention to the subject by addressing the farmers of Ontario through the London and Toronto newspapers under date of July 28th, and soon became involved in an extensive correspondence on this subject. My impression as stated at the time with regard to the extent of injury to the crop on Mr. Wallis's farm, was, that it would prove to be a loss of about 20 per cent., an estimate which results have since shown to be rather under than over the mark. There were many other wheat fields about London worse than those of Mr. Wallis, and if with his careful farming—involving proper rotation of crops and thorough manuring—his loss was so large, it must have been much larger in proportion on many farms less judiciously managed.

As indicating the area over which the insect prevailed, the following extracts from correspondence are submitted : Mr. John Morrison jr., of Oban, Lambton Co., says, "In reply to your letter in the *Weekly Globe*, I would say, that our own fields are badly infested with the Hessian Fly, more than half the crop, I should judge, being injured ; other fields I have seen about here are not quite so bad but still injured apparently to the extent of from 20 to 40 per cent."

Dr. C. P. Pitcher, of Jerseyville, sent me samples of wheat containing the larva of the Hessian Fly from his district, and writes, "the enclosed samples of the work of the Hessian Fly I cut from a field of wheat on the farm of Mr. Zenus Weaver, in the Township of Ancaster, Co. Wentworth. Had my attention not been drawn to the subject by your letter in the *Globe*, I should not have investigated the matter. There is a considerable proportion of the wheat in this district crinkled down from this cause."

Mr. Roland W. Gregory, of St. Catharines says, "I herewith send you statement of my experience with the Hessian Fly in my present crop. About the middle of September last, I sowed a field of about seven acres of wheat, which I had fallowed and covered with manure, the field as I thought being in an excellent condition for a crop of wheat. The season being very dry and the soil not uniform in its character, varying from light sand to sandy loam, clay loam, and clay, the wheat did not come up evenly. On that part of the field where the wheat came up first and looked well in the fall, the Hessian Fly commenced working, and in the latter part of November I found one plant on which I counted nineteen of the small maggots, while in that portion of the field where the soil was poor the wheat came up later and escaped the fly, and the crop is now very heavy. In that part of the field so badly infested with it, nearly every stem had the insect in it in the flax-seed state."

Mr. James Hammond, of Hammond P. O., Perth Co., writes under date of 7th of August as follows: "I noticed some time ago that something was doing considerable damage amongst my fall wheat (silver chaff variety). I mentioned the fact to some of my neighbours, telling them that it appeared to be cut at, or near the ground, but they appeared to be equally ignorant with myself as to the cause, and I thought little more about it until I saw your letter in the last issue of the *Weekly Globe*, when I examined some stalks, and find from your description that it is the genuine Hessian Fly. I enclose herewith samples of the insect in stalk, from which you will be able to judge of the correctness of my conclusion." These stalks from Mr. Hammond contained the insects in the flax seed state.

Judging from these letters which may be taken as fair samples of the correspondence, the estimate formed was, I think, rather under than over the mark, and the aggregate loss to the farmers of Ontario from the depredations of this insect during the past season must be a very large sum, as the area of land under wheat was very extensive.

Through the kindness of Mr. John Wallis, I have been enabled to compare the weight and appearance of the grain in the ears of the injured stalks with that of those of the healthy ones. I find that 100 of the kernels from the healthy plants which presented a plump appearance and a firm structure weighed 120 grains, while the same number taken from diseased stalks present a shrivelled appearance and a structure much less firm, and weighed only 59 grains, a difference of a little more than 100 per cent. By late sowing as recommended in my annual address to the Entomological Society in August last, Mr. Wallis now has a field of fall wheat in excellent condition, occupying the same ground as that on which the wheat was most injured last season. In order to test the value of this recommendation, he has departed from his usual course of rotation of crop so as to give the insects a fair chance, and judging from appearances at the present time it promises an abundant yield.

HOMOPTERA.—THE HARVEST FLIES AND THEIR ALLIES.

By James Fletcher, Ottawa, Ont.

The Cicadæ or Harvest Flies belong to that order which is known to Entomologists under the name of Hemiptera, (from two Greek words ἥμι = half, and πτερόν = a wing).

It is to this order of insects, alone, that the name—bug—properly belongs. Although now generally applied to all kinds of insects, it appears formerly to have been used for any object of terror, real or imaginary, and also as a term of contempt for something disagreeable and hateful; we have a remnant of its original meaning in the word "bug-bear." Perhaps the name was applied more distinctively to the Hemiptera on account of the disgusting odour which many of the Heteropterous members of the order have the power of emitting when disturbed.

In their earlier stages the Hemiptera have what are known as Incomplete Metamorphoses—that is, they do not entirely change their conditions during each of the different periods of their existence, as the Lepidoptera and Coleoptera do, where there is first of all the egg that hatches into an active larva which when full grown passes into a quiescent pupal state, previous to the fully developed imago condition.

The pupæ of the Hemiptera are active and very similar to the larvæ; in fact the only noticeable change which takes place in the form of these insects, from the time the egg hatches until they attain the perfect shape, is a gradual development of their wing covers and wings, and the growth of their bodies which makes it necessary for them to frequently cast their skins. When all the transformations have been completed, the imagines (perfect insects) generally possess four wings; the superior pair or hemelytra which are attached to the mesothorax, have the basal part or *corium* opaque and of a leathery consistence and the apical portion membranous and transparent; the inferior pair are attached to the metathorax and are entirely membranous and generally transparent and capable of being folded when the insect is in repose.

The whole of these insects are *Suctorial*—that is, live on fluids. To enable them to do this their mouth parts consist of a more or less slender beak or *promuscis*, which varies

according to the food or the circumstances under which they live. Those species which feed on animal food or under bark, have shorter and thicker beaks than those which derive their nourishment from vegetation, and as the former are for the most part beneficial and feed on other insects, this is a very important distinction for everyone to become familiar with. The beak consists of the labium, which is so modified as to form a hollow sheath, by having its two sides turned up, so that a deep groove is left in the middle of its upper surface, which acts both as a canal up which the juices on which the insect feeds flow, and also as a sheath for four delicate sharply pointed *setæ* or bristles which are actually the jaws and maxillæ modified for a special use. It is with these instruments that the insect punctures the plant or animal from which it derives its food.

The insects comprised in this order are of the most anomalous shapes, and there are embraced within its limits some of the most curious and wonderful forms of insect life. Their geographical range is very wide, for there is hardly any part of the globe of which the land and water do not produce their own peculiar forms. The number of species classed within this order is said to reach nearly 10,500, which are about equally divided between the two sub-orders into which the Hemiptera are divided. These two sub-orders are called Hemiptera-heteroptera and Hemiptera-homoptera, which again are divided into divisions and sub-divisions, and the latter of these are distributed into families which contain the various genera and species.

It was Latreille who divided the Hemiptora into these two divisions: "The Homoptera are the higher in rank, as the body is more cephalized, the parts of the body more specialized, and in the Aphidæ which top the series, we have a greater sexual differentiation, the females being both sexual and asexual, the latter by a budding process, and without the interposition of the male, producing immense numbers of young which feed in colonies. The Heteroptera, on the other hand, have the body less compactly put together, the abdomen and thorax are elongated, the head is small compared with the rest of the body, and the species are large (a sign of degradation among insects) and several families are aquatic, indicating a lower grade of development, while representatives of these were the first to appear in geological times. Their affinities are with the Orthoptera and Neuroptera, while the Homoptera whose bodies are more cylindrical ally themselves with the first and higher series of sub-orders."—(Packard).

For convenience sake we will take a short glance at the Heteroptera first, and then pass on to the Homoptera.

In the Hemiptera-heteroptera (ἕτερος = various, πτερα = wings) the hemelytra are thick and opaque at the base, but membranous and translucent at the tips; they lie horizontally on the top of the back and cross each other obliquely so that the translucent part of one overlaps the same part of the other. The underwings which these cover are entirely membranous; the head is horizontal and bears on its front part the articulated promuscis or beak which is bent down and carried underneath the breast. Between the wings there is a scutellum which is generally triangular, but which is sometimes so large as to cover the whole of the upper side of the body, leaving only the margins of the fore-wings visible. (See figure 83). The modes of life among these bugs are very varied; animals, birds, insects and plants are all liable to their attacks, and they are sometimes exceedingly destructive. For the most part they are found upon the plants on which they subsist; but others again feed on weaker insects found in similar situations. They continue active and require food during all their stages. The larvæ are distinguished by the total want of any appearance of wings; whilst in the pupæ the rudiments of these limbs appear on the back of the thorax. All of these insects have ocelli or simple eyes on the front of the head between the two large compound eyes, but these, like the wings, are only developed in the perfect state.

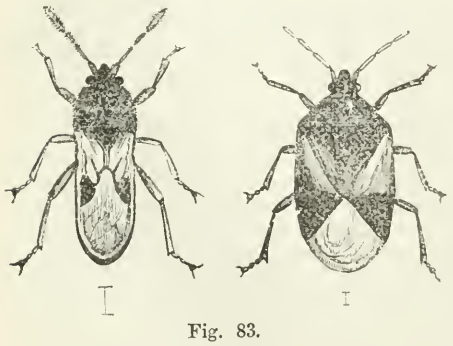


Fig. 83.

The great entomologist, Latreille, divided this order into two primary sections to which he applied the names of *Geocorisa* or Land Bugs, and *Hydrocorisa* or Water Bugs. Westwood, however, improved on this arrangement by calling the former of these *Aurocorisa*, or Air Bugs, because there were certain species (Hydrometridæ) which had to be included in it, but which do not live on land, but pass the greater part of their time on the water, although they never dive below the surface. These species were also included by Latreille in his Geocorisæ and called Ploteres. Westwood's arrangement of Latreille's system was as follows :—

(1.) Hydrocorisa, or those which reside in water.

(2.) Aurocorisa, or those which breathe the free air.

1. *Hydrocorisa.*—There are many species of water bugs which differ very much in appearance, but they all have the antennæ very short and concealed in cavities beneath the eyes, their legs are modified according to their mode of life : the anterior pair are short and fold close to the body, forming a pair of claw-like organs with which they seize their prey ; the other legs, particularly the last pair, are generally elongated and ciliated with stiff bristles which spread out when the limb is driven backward through the water and so act as the blade of an oar ; of course when drawn forward they pass through the water easily. The eyes are often of a large size. Nearly all the species in this group are of a dull inconspicuous colour. They have to come to the surface of the water frequently to obtain a supply of atmospheric air, which they carry down to the bottom again in different ways ; among the Notonectidæ it is carried in a space beneath the closely fitting hemelytra and the upper surface of the abdomen, where it is retained by means of rows of hairs. It is into this cavity that the spiracles or mouths of the breathing tubes open.

2. *Aurocorisa.*—In this section the insects may be generally recognized by the greater length of the antennæ, and by the legs being fitted for running and walking and not for swimming. Good examples of these insects are found in the destructive Squash Bugs and Chinch Bugs, as well as in the useful Spined Soldier Bugs and Rapacious Soldier Bugs. This, too, is the section which boasts the possession of that highly objectionable creature, the bed-bug (Acanthia lectularia), but it also includes the Reduvii, a family of cannibal insects, one species of which, R. personatus, is known in Europe to feed on these, and which family is represented in Canada by some useful species.

The other sub-order of the Hemiptera is called Hemiptera-homoptera (ὁμός = like, πτερα = wings), or same winged, because both the upper and under pairs of wings are of a similar character ; both pairs are membranous, generally transparent and net-veined, the upper larger than the lower. The wings do not lap over each other when the insect is in repose as is the case among the Heteroptera, but are much deflexed at the sides and lie over the back like the roof of a house. The body is generally thick and convex, rather than depressed, and this partly accounts for the deflexed position the wings take when not in use. With few exceptions the antennæ are very short and bristle like. The face is either vertical or slopes obliquely under the body, so that the beak, which is composed of three joints, two short ones and one very long one, is set rather far back and issues from the under surface of the head close to the breast. In nearly all it is long and slender, as they all feed entirely on vegetable juices.

Within the limits of this sub-order are included some very grotesque and curious forms, and some which at first sight are apparently very dissimilar ; but which, on a careful examination can easily be recognised as belonging to the same group. There are the Musical Cicadæ, the well-known Lantern-flies, the active, strangely-formed little Tree-hoppers and Leaf-hoppers, the Cuckoo-spit insects or Frog-hoppers, the lively Psyllidæ, the destructive Aphides or Plant-lice, with their remarkable transformations, and the extraordinary Coccidæ, or scale insects, which bear a closer resemblance to vegetable excresences than to living animals.

None of the species have more than three joints of the feet, and Mr. Westwood considered this such an important character that he based his system upon it, dividing them into three sections :—

1. Trimera. Tarsi three jointed ; antennæ minute, setigerous ; wings areolate.
2. Dimera. Tarsi two jointed ; antennæ, filiform, 5 to 10 jointed ; wings sub-areolate.
3. Monomera. Tarsi one jointed ; antennæ, 6 to 25 jointed ; wings not areolate.

In the first of these divisions the Cicadæ or Harvest flies find their appropriate place —in fact the first section of Westwood's arrangement corresponds with Linné's genus Cicada, or Latreille's family Cicadaires. The name of the Cicadæ is supposed by some to be a hybrid word derived from the Latin *Ciccum* = a thin skin, and the Greek ἄδειν = to please, in reference to its song; others derive its name from the Latin words *Cito Cadat*, implying that the perfect insects are short-lived. The Cicadidæ are the largest insects in the sub-order. In Westwood's Arcana Entomologica, Pl. 51, there is a figure of a gigantic species *(Cicada Imperatoria*, Westwood) which measures eight inches and a quarter between the tips of the outstretched wings, and in my own collection I have a very beautiful Indian species which measures six inches. This latter belongs to a group of the Cicadidæ, in which the wings are opaque and more or less coriaceous; the upper wings are of a dull, reddish black, with the veins of a slightly lighter shade, and across the middle of them there is a broad white band three-sixteenths of an inch wide; the rest of the upper surface is black, with the exception of a bright orange band across the prothorax. The eyes and the abdomen are a rich brown and the underwings a deep velvety black.

The Cicadidæ have the head short and broad with two large prominent eyes and three ocelli placed in a triangle between them; usually the wings are completely membranous, of a uniform consistence and delicately transparent, with few but distinct nerves. There are, however, a few exceptions to this rule, as in the Indian genus Polyneura, where the apical division of the wings is very thickly reticulated; and in a small group of the Cicadæ where the hemelytra are wholly, or in part, of a coriaceous nature. The abdomen is short and pointed, and the legs are short, the anterior femora are much thickened and toothed beneath. The ovipositor of the female is a very interesting object. This organ, which is the instrument with which the female places her eggs in a safe and proper asylum to wait until they are hatched, is lodged in a sheath which lies in a groove of the last ring of the abdomen. It is of equal thickness throughout, except at the tip, where it is slightly enlarged and angular. On each side it bears a set of nineteen sharp teeth, very fine at the point, and from that gradually increasing in size. The sheath is composed of two horny pieces, slightly curved, and ending in the form of a long spoon, so that the concave or hollow part may receive the convex or rounded part of the ovipositor. On examining this auger, for such it really is, under the microscope, it will be found to be three pieces most beautifully fitted together—two outer ones which have an alternate and separate motion, and on the outside edges of which the rows of teeth before mentioned are situated, and another fixed single piece, in between the other two, at the back, to which they act as a sheath, but which in turn supports and keeps them in their proper place by means of two internally-dilated lateral grooves, which receive the dilated edges of the serrated pieces, and in which these slip up and down. This last supporting dorsal-piece has a deep groove down its centre, and it is thought to consist of two separate pieces firmly soldered together, but which have not the slightest motion independent of each other. This instrument is composed of a hard horny substance called chitine, the same as are the stings of bees and wasps, and the ovipositors of Ichneumon flies. The auger of the Cicada then consists of two sharp saws which work alternately, and a central supporting dorsal-piece which holds them in their place and strengthens them. This instrument somewhat resembles the saw of the saw-flies, but as it has slightly different work to perform it bears corresponding modifications. It would, however, be impossible to conceive anything more exactly fitted for their required uses than these beautiful organs are.

The most peculiar characteristic of this family however consists in the structure of the musical instrument with which the males make the trilling sound for which they have been famous since ancient times. These organs are internal, and consist of two stretched membranes which are acted upon by two strong muscles, and the sound issues from two holes beneath two special expansions of the metasternum, which both cover up and protect these tympana or sound organs, and also act as sounding boards. The song varies much in the different species, and it would appear that the voice of the European one must have a much more grateful tone than that of his American cousin which we know, for we read in Kirby and Spence that the song of the Cicada has been a favourite theme in the verses

of every Grecian bard from the time of Homer to Anacreon. In Westwood's "Arcana Entomologica" the following translation of Anacreon's ode to the Cicada is given :—

Happy creature! what below
Can more happy live than thou?
Seated on thy leafy throne,
(Summer weaves thy verdant crown,)
Sipping o'er the pearly lawn
The fragrant nectar of the dawn;
Mirthful tales thou lov'st to sing,
"Every inch" an Insect King:
Thine the treasures of the field,
All thy own the seasons yield;
Nature plants for thee the year,
Songster to the shepherds dear:
Innocent, of placid fame,
Who of men can boast the same?
Thine the lavished voice of praise,
Harbinger of fruitful days;
Darling of the tuneful nine,
Phœbus is thy sire divine;
Phœbus to thy notes has given
Music from the spheres of heaven:
Happy most as first of earth;
All thy hours are peace and mirth;
Cares nor pains to thee belong,
Thou alone art ever young;
Thine the pure immortal vein,
Blood nor flesh thy life sustain;
Rich in spirits—health thy feast;
Thou'rt a demigod at least.

These insects are also emblematically represented in the hieroglyphics of Egypt as priests—"They were called Tettix by the Greeks by whom they were often kept in cages for the sake of their song. Supposed to be perfectly harmless and to live only on the dew, they were addressed by the most endearing epithets and were regarded as all but divine. One bard entreats the shepherds to spare the innoxious Tettix, that nightingale of the nymphs, and to make those mischievous birds—the thrush and blackbird—their prey. Sweet prophet of the summer, says Anacreon, addressing this insect; the muses love thee; Phœbus himself loves thee, and has given thee a shrill song; old age does not wear thee out; thou art wise, earth-born, musical, impassive, without blood; thou art almost like a God. So attached were the Athenians to these insects that they were accustomed to fasten golden images of them in their hair, implying at the same time a boast that they themselves, as well as the Cicadæ, were *Terræ filii*. They were regarded indeed by all as the happiest as well as the most innocent of animals—not, we will suppose, for the reason given in the couplet by the saucy Rhodian bard, Xenarchus, where he notices the peculiarity of the males alone being possessed of the power of singing, and says :—

'Happy are the Cicadæ's lives,
Since they all have voiceless wives.'"

That the Grecian Cicadæ had more musical notes than ours is proved by the fact that its song and the music of the harp were both called by the same name τερετισμα. The Cicada was the emblem of the Science of Music, which was accounted for as follows:—When two rival musicians, Eunomus and Ariston were contending on the harp, the former broke a string and would have been beaten but a Cicada flew down, and settling on his harp, supplied with his voice the missing string and gained him the victory. At Surinam there is a species which is still called *Lierman*, from a supposed resemblance between the sound of the harp or lyre and its song.

Virgil accuses a species found in Italy of bursting the very shrubs with its voice. As far as our own species are concerned, too, I fear no one but an enthusiastic Entomologist, could persuade himself that he found anything very pleasing in the song. I know of nothing more similar to that of *C. pruinosa*, the Frosted Harvest fly, than the noise of a scissors-grinder's wheel. The short carol seems to be produced with a tremendous effort, slowly at first, and gradually rising in intensity of pitch, until at a certain point it begins to descend rapidly, so that one might suppose, if the chorister made the noise with his throat, that he had been seized by that member and were being strangled.

The Dog-day Cicada, or Frosted Harvest fly, which is known under the name of *C. canicularis*, as well as that given above, is by far the commonest species in Canada. It is a large handsome fly, sometimes over two inches in length from the front of the face to the end of the hemelytra. The head is black and prettily variegated with green and brown markings; it is very wide, short and transverse; the eyes are prominent, and the thorax is broad and also ornamented with green and brown markings. The wings are transparent and slightly hyaline. The outer edge and the veins of the basal portion are green for about one-third of their extent and deep brown for the remainder; towards the apex of each hemelytron there is a brown W shaped mark. This insect, which is to be heard on hot days throughout the whole summer, is tolerably common in Canada, but is somewhat difficult to capture. In passing through the rocky country between Lake Superior and Manitoba about the middle of last September, I heard many of these flies trilling out their shrill notes. The specific name *pruinosa* = frosted, is given on account of the newly-evolved imagines being thickly covered beneath their abdomens with a white powdery matter, which gradually gets rubbed off as the insects get older.

In the United States this Cicada is carried off by large burrowing wasps or hornets as food for their young. These wasps are exceedingly handsome and are called *Stizus grandis* and *S. speciosus*. I have a specimen of the former of these which was captured in the act by Mr. A. H. Moore in the Smithsonian grounds at Washington. It measures one inch and three-quarters from the forehead to the tip of the abdomen, and possesses a large formidable sting with which these insects paralyze their victims previous to storing them away as food for their progeny. In the American Entomologist, vol. 1, N.S., there is a most interesting account of the instinct displayed by *S. speciosus* in availing itself of a favourable wind to transport its victims to its burrows, which, on account of their large size compared with its own, it would be unable to do without some assistance.

Cicada rimosa, Say.—The Creviced Harvest fly is the smallest species we have; it generally appears a few weeks previous to *pruinosa*, and in the United States at the same time as *C. septendecim*, which it resembles somewhat and with which it has been frequently confounded. It has the outer edge of the wings, parts of the legs and the edges of the abdomen of a yellowish brown, but not so bright as in *septendecim*, and the eyes are dark. In size, too, it is much smaller.

Cicada septendecim, L.: the Seventeen-year Locust.—This remarkable insect, concerning which so much has been written, is also said to have been found in Canada. It is a slighter insect than *C. pruinosa*, and its colours are much brighter; the body is black and the eyes reddish orange, the legs and under-side of the abdomen are orange, as are also the outside edges and veins of the wings.

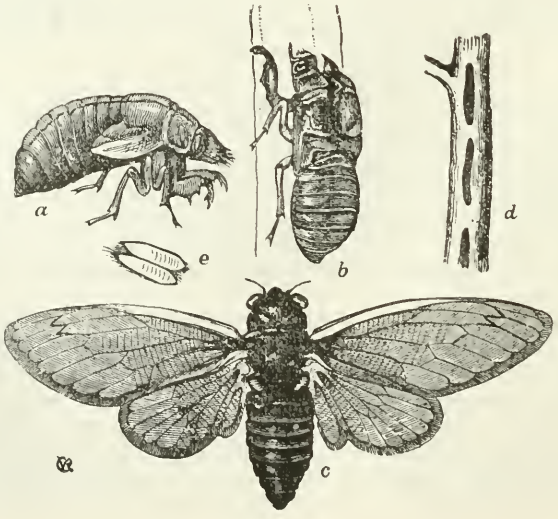


Fig. 84.

Fig. 84, copied from Prof. C. V. Riley's first report of Missouri, gives a very good idea of the appearance of this insect in its various stages: *a* represents the pupa which is honey-yellow in colour; *b*, the cast-off skin from which the perfect insect has emerged through the rent in the back. When the larva is first hatched from the egg it presents the appearance shown at Fig. 86, and is an active little creature which moves its long eight jointed antennæ as dexterously and rapidly as does an ant; the mature larva differs considerably from the newly-hatched one, but principally in having shorter antennæ; *c* represents the fully developed fly, and *d* a piece of a young branch which has been bored by the ovipositor of the female for the reception of her eggs, which are shown at *e*. As its name implies, this insect generally requires seventeen years to complete its transformations; this fact was pointed out many years ago by the botanist Kalm.

Prof. Riley, who has given this species a great deal of study, and discovered many interesting points in its history, was the first to work out the problem of its periodical appearances. He found that there are also thirteen year broods and that both sometimes occur in the same locality, but that in general terms the thirteen year brood might be called the southern form, and the seventeen year the northern form; at the two limits of their respective ranges these broods over-lap each other. The shorter-lived form he called provisionally *C. tredecim*. It was the existence of this brood which caused Entomologists to doubt the propriety of Linné's name, until Prof. Riley cleared the matter up, because they could not make the dates of its periodical visits correct when calculating each appearance as occuring at the end of every seventeen years in any one locality. In his first Missouri Report he gives a full account of his investigations, and relates that "it happened that one of the largest seventeen year broods occurred simultaneously with one of the largest thirteen year broods in the summer of 1868. Such an event, so far as regards these two particular broods, has not taken place since the year 1647, nor will it take place again till the year 2089.

There are absolutely no specific differences between the two broods other than in the time of maturing. Another interesting discovery was, that there is a dimorphous form which appears with both these broods. It is much smaller and differs in many important points from the ordinary form. The colour is much darker, it has an entirely different voice, appears a fortnight sooner, and the two forms never copulate. This form was described by Dr. J. C. Fisher in 1851, as *C. Cassinii*, but the specific differences are not considered to be sufficiently well defined to give it the rank of a species.

The perfect insects make their appearance in the United States in the beginning of June, and last for about a month, and as they generally appear in vast numbers, they do considerable damage. Local changes take place so rapidly now, and these flies take so long to perfect themselves, that frequently roads are built and paths made in places where, perhaps seventeen years before, when they were hatched from the egg, it was virgin soil. This contingency frequently makes it necessary for them to bore through hard roads and between stones well beaten down; and that they do this, the honeycombed state of the ground bears ample testimony. When the larvæ, in which stage the insect passes the greater part of its life, is full grown, it works its way up towards the surface, and then turns to the pupa state, which only lasts a few days. When they are ready to emerge they leave their burrows as evening draws on, and crawl up on to some object elevated above the ground, such as a fence or the stem of a plant; this they grasp firmly with their claws, the skin of the back bursts and ten minutes afterwards the perfect insect has entirely freed itself of all encumbrance; the wings soon develop, but it is not for three or four days that the muscles harden sufficiently for them to assume their characteristic rapid flight and shrill song. As is the case with several other insects the males make their appearance some days before the females, and also leave sooner. The skin of the pupa (Fig. 84 *b*) retains its perfect shape for many months after the fly has left it. Those of *C. pruinosa* are very common here in a dry rocky wood. Prof. Riley also figures a remarkable chamber built up by the larva of this species in localities where the soil was low and swampy, and in which was found the pupa awaiting the time of its change to the winged state. These

chambers were first noticed by Mr. S. S. Rathvon at Lancaster, Pa., and are from four to six inches above the ground, with a diameter of one inch and a quarter. (See fig. 85.) When ready to emerge the insect backs down to an orifice which it left in the side of the structure, even with the surface of the ground, issues forth and undergoes its transformations in the usual manner. After pairing the females deposit their eggs in the twigs of different trees—oak, hickory, and apple chiefly, but also in many other kinds, and even sometimes in coniferous trees. The eggs are placed at the bottom of grooves bored by means of the ovipositor. The insect settles on a branch of moderate size, which she clasps on both sides with her head towards the end, then bending down the piercer at an angle of 45 degrees, thrusts it obliquely through the bark and fibres into the very centre of the twig; after this nidus is finished she deposits the eggs in two rows with a narrow strip of wood left between them; there are from ten to twenty eggs in each groove. It takes about fifteen minutes to prepare a groove and fill it with eggs. There are sometimes as many as twenty grooves made in a branch by one insect, and each female has a stock of from 500 to 700 eggs. It frequently happens that these branches bearing the eggs, are so weakened by the operation, that they are broken off by the wind, and fall to the ground; when this is the case the eggs never hatch, for, like those of many of the gall flies the moisture of the living wood is necessary for their proper development, as shown by the fact that they are much larger just before hatching than when first deposited about six weeks before. When hatched, they throw themselves fearlessly from the tree to the ground, and from their small size, one line in length, they are very light and receive no injury. The newly-hatched insect is shown in fig. 86. They immediately burrow down into the ground and feed on roots. There are numberless stories in the newspapers every year about people being stung by the Cicadas, but none have ever been satisfactorily proved.

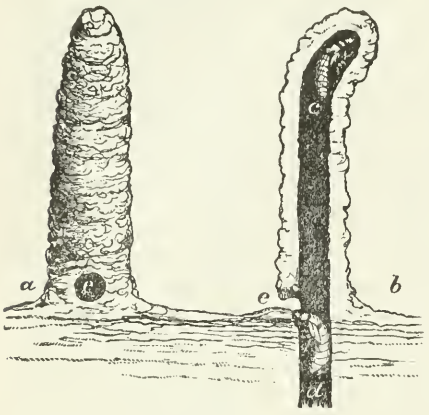


Fig. 85.

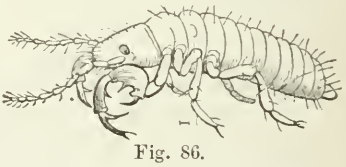


Fig. 86.

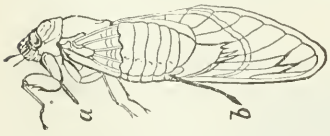


Fig. 87.

If these tales be true the injuries could, of course, only be inflicted by the beak, fig. 87 *a*, or by the ovipositor *b*, but I fancy that these tales are about as true as the newspaper accounts of the "frightful poisonings" yearly laid at the door of the larva of the Tomato Sphinx:

"The song of this species is in one uniform musical key, which is *C* sharp."

Of the Fulgoridæ or Lantern flies there is a small species found in the United States called *Scolops dulcipes*, which has the front part of the head much prolonged and projecting upward like a thin curved horn. Prof. T. Glover found it not uncommon in July and September in the neighbourhood of Maryland Agricultural College. None have so far been recorded from Canada.

Among the Cercopidæ are found several strange genera, including the Tree-hoppers, Frog-hoppers and Leaf-hoppers. The Tree-hoppers (Membracis of Harris) are dull-coloured little insects which are to be found on the stems and leaves of plants during the summer and autumn months. Many of them have very grotesque forms with the face nearly vertical, the thorax tapering to a point behind, and so much enlarged as to cover the greater part of the upper side of the body; it is too frequently ornamented with blotches or stripes of another colour. These insects are well protected from detection by their enemies, both by their habits and by a striking resemblance which frequently exists

between their shapes or marking and those portions of the plants which they infest. They are mostly angular in outline, some have the upper surface, which consists chiefly of the enlarged thorax, rough and dark coloured like the bark of a tree; others have horn-like processes resembling the thorns of a plant; this simile is further carried out by a habit they have of sitting still for hours on the stem of a plant with their heads all turned one way —upwards towards the end of the shoot. Some again are protected by their colours, as the green species which are found among foliage, or the brown and mottled ones which frequent the bark and stems of trees. Although, as stated above, they will sit still without moving for hours together, they are by no means asleep and are very difficult to capture. A slight movement is sufficient to make them spring from their resting-place with great quickness, and they settle again so suddenly that it is no easy matter to follow them. There is no class of insects which proves so well as these do the advantage of an Entomologist being to a certain extent an artist, for the colours of many of these interesting little insects are so fugitive that many of them lose their brightness almost before they are moved from the setting boards, and for a thorough study, paintings of them as caught are essential. We have several species in Canada, of which the following are some of the most interesting of those taken in the vicinity of Ottawa. They were most of them taken in the beating net, of which an illustration was given in the Canadian Entomologist for 1878, at page 62. I may mention that this net has received a thorough trial at the hands of my colleague, Mr. Harrington, and myself, and we have found it most satisfactory, and by far the most convenient pattern yet brought to our notice.

Enchenopa binotata, Say: the two-spotted Tree-hopper.—This is perhaps the prettiest and most curious little insect we have of this order. Its shape, in profile, is exactly that of a partridge with outstretched neck and head. It also has the habit of congregating in small clusters on the stems of the plants it feeds upon, and as there are generally specimens in all the different stages of growth, they may be likened to a brood of those birds. Sometimes the perfect insects form in single file along a branch, when they look like thorns or excresences of the bark. The long neck-like extension is only a prolongation of the thorax, the head of course is underneath and furnished with a promuscis or beak for sucking sap. The general colour is a dark brown, and there are two yellow spots separated by a black space on the ridge of the back (thorax). The total length is not more than four lines from the apex of the wings to the tip of the thoracic protuberance. One of the most remarkable characteristics of these insects is found in the shape of the four anterior tibiæ, which are very broad and flat. It is not an uncommon species, and is found on several trees such as hickory, butternut, locust and *Celastrus scandens*.

Smilia vau, Harris.—The V-marked Tree-hopper is also found on the hickory and butternut. It is about three lines in length with the thorax, which forms an arched crest over the body, rounded in front and keeled from the middle backwards to the tip. It is of a brown colour, and has its back ornamented with V-shaped marks.

Entilia carinata, Forster: the keeled Tree-hopper.—This species I have found plentifully on the common sun-flower (Helianthus annuus) clustered together in small families beneath the leaves. They are about one-fifth of an inch long and have two humps on the back, the space between them being in the shape of a complete semi-circle. The colours vary much: in some specimens it is a light cinnamon with wavy lines running to the posterior angle of the very large thorax. In others it is a dark reddish brown with a broad subterminal white band, the front is almost perpendicular and black.

Ceresa bubalus, Fabr.: the Buffalo Tree-hopper.—The colour of this species is a beautiful green. It is very triangular in shape, and has a pair of sharp curved spines, one on each side of the thorax, which somewhat resemble the horns of a buffalo, and from which fact it takes its specific name. It is a very active species, and flies a long distance when disturbed. I have taken it on young apple-trees and rose-bushes. The eggs are said to be deposited in a curved row, in a series of punctures made by the ovipositor of the female in the bark of several trees. It has been accused of injuring grape-vines by puncturing the bark of the stems for this purpose.

C. diceros, Say.—The two-horned Tree-hopper much resembles the last in shape and

size, but has a brown spot on each side of the thorax behind the horns, and a bar across the middle of the back and the posterior tip, of the same colour.

Telamona ampelopsidis, Harris.—Is a rather large Tree-hopper, sometimes measuring half an inch in length. It is found on the Virginian Creeper (*Ampelopsis quinquefolia*) and is very much the same colour as the bark of that plant. The thorax is raised up in the middle into a square hump and is crossed with three, more or less distinct, brown bands. I have taken this insect in the month of July.

In some of the Cercopidæ the face slopes downwards towards the breast; the thorax is of moderate size, and never extends much beyond the base of the wing-cases, and does not conceal the head when viewed from above.

The Frog-hoppers (Amphrophora), also called Cuckoo-spits, are those insects which have the habit of enveloping themselves in the remains of the liquid food which they suck from plants and then eject again in the form of a frothy substance with which they entirely cover themselves, in the same way that the larvæ of some beetles, to a less extent, cover their bodies with the remains of their solid food. In the perfect state, to which they attain late in the summer, they are very active insects, mostly of dull colours, and are to be found in grass and low herbage; one species, however, *A. parallela*, Say, is the insect which forms the small masses of foam, which may be seen on the young branches of pine trees in June and July. It is an oval brown insect about half an inch long with a white spot in the middle of each hemelytron. The popular names of these insects are taken from an absurd idea, which actually dates back to the days of Aristotle, and which is fully believed in by many people even to-day that the frothy excrementitious secretion was the spittle of the cuckoo or the frog.

Clastoptera proteus, Say, is a pretty little short and broad insect, roundish in shape and about two lines in length, having the head and thorax black with three bright yellow stripes; the hemelytra are of a peculiar shape, being deeply grooved in the middle and having the apices turned abruptly down; they are also marked with two short oblique yellow stripes, running from the shoulders to the middle of the back, and at the tip of each wing-cover there is a black spot. This species is said to feed on the cranberry and blueberry.

C. obtusa, Say, found on hickory, is a rather larger species of a much less conspicuous colour, being brownish grey, and having the hemelytra veined and spotted with brown towards the apex.

The Leaf-hoppers (Erythroneura).—There is no better known example of this genus than that dreadful little pest—the grape-vine leaf-hopper *E. vitis*, which in some years will entirely spoil a whole crop of grapes by destroying the leaves just when the berries are half formed. This annoying little fly is almost rendering impossible the cultivation of the ornamental Virginia Creeper in this city.

The grape-vines do not appear to have suffered so much, although the havoc among these has been very great. The insect that causes all this mischief is really a most beautiful little creature. It is yellow with two red bands across the wings. (See Fig. 88). In the larva state it is bright crimson and has a very curious sidelong motion like a crab. The perfect fly nearly always settles underneath the leaf and sucks the sap from the parenchyma by means of its little trunk. The leaves first turn white, in patches, and then fall off. When large numbers of these flies spring from the leaves, as they will if the foliage is moved, they make quite a perceptible sound like rain. I have found them exceedingly difficult to combat, and really think the only way is to disturb them at night and hold a torch for them to fly into. There are a great many species of this genus in Canada, one of which is very troublesome to the apple. These flies are generally, but erroneously, called Thrips.

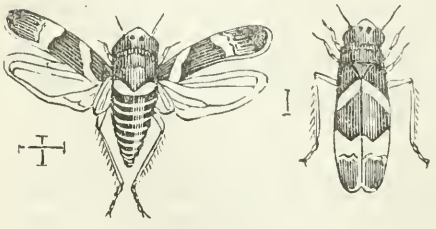


Fig. 88.

The second section of the Homoptera is known as Dimera, or those with two jointed feet. In this section we find very much smaller insects with antennæ longer than the head and in the winged individuals four wings ordinarily all of the same membranous texture. There are only two genera Psyllidæ and Aphidæ. The Psyllidæ or Flea-lice are small insects found on leaves and in some species raising galls. Although several kinds are known to occur, almost every tree having its own species, very few have been described. They have rather long antennæ terminated by two slender bristles ; the beak is short and triarticulate, and the eyes are lateral and prominent as in the Cicadæ. On the front of the face are three ocelli placed in a triangle, the posterior ones quite close to the eyes.

The larvæ and pupæ have the body very flat, and in some species as *Psylla celtidis-mamma*, Riley, live in galls. I exhibited at the last annual meeting of the Society in Montreal specimens of the galls and pupæ of this species, and Prof. Riley then kindly informed me of its proper name, and told me where the only printed description could be found, namely, in an article written by himself for Johnson's "New Universal Cyclopædia," under the head of "Galls." For the benefit of our members I reproduce this in full :—"The Flea-lice produce galls of various shapes and sizes on the stems and leaves of the Hackberry (Celtis). In life habits they differ from all the other gall insects, and agree with their nearest relatives, the Plant-lice, only in being the architects of their own galls. The egg, glued in spring to tender leaf or twig, soon hatches, and under the irritation caused by the young Psylla the gall soon embeds it. Within this gall the insect dwells till it has acquired the pupa state, which is generally by the time the leaves begin to turn and drop, then by means of certain horny spines or thorns at the end of its body, this pupa works its way out of its prison, and once out soon gives forth the perfect fly. The galls made by these Flea-lice are generally woody. Most of them are yet undescribed. *P. celtidis grandis* (Riley, M.S.) makes on the leaf-stalks a large grayish yellow swelling, which is an exception in being polythalamous. The few cells it contains are more or less filled with a white flocculent matter secreted by the insect." The perfect insect of *P. celtidis-mamma* appears in September and passes the winter in the crevices of the rough bark of the hackberry on which it underwent its preparatory stages, and adjacent trees. On November 24th last, I collected several specimens in a torpid state. The males are about one-eighth of an inch in length, and the females about one-third larger. The wings are deflexed at the sides of the body, and the hemelytra, which are rounded at the tips, are traversed by three strong nerves (the costal, median, and sub-median), each divided but once and disposed as shown in Fig. 89, which is another species, but serves

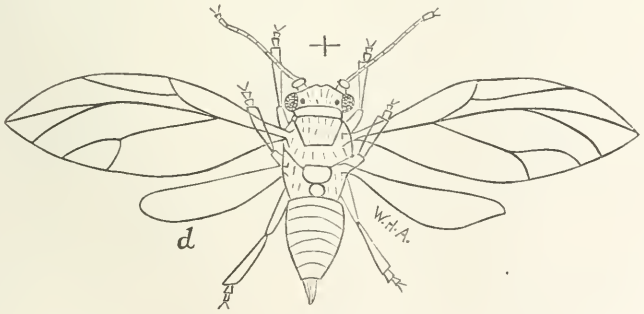


Fig. 89.

to show the general arrangement; the underwings are much more transparent and the nerves are very delicate. The colour is grey like the bark of the trees on which they are found ; the antennæ which are terminated by two pairs of bristles are composed of ten joints, the eight basal ones yellow striped with black at their upper ends, and the two terminal ones entirely black. The femora are black for the greater part of their length,

as are the tarsi entirely; the tibiæ are yellow. The thorax is black with a white median stripe, and the wing-cases are prettily mottled with brownish dots which form a dark triangular spot, in the middle of each, with the base on the costal margin; there is also a dark spot at the junction of each nerve with the margin, which has the effect of leaving a more or less distinct sub-terminal white band. The colours vary considerably, but seem to be darker in the females. The abdomen of the male is terminated by several bristle-like appendages, and that of the female by a conical ovipositor. In general appearance, although little more than one line in length, these insects much resemble miniature Cicadæ. I found that many of the galls of this species also were polythalamous, one which I opened containing four pupæ. The occurrence of this insect at Ottawa is somewhat interesting. The three trees of *Celtis occidentalis* upon which the galls occur are the only specimens of that tree which I have found in this locality, during four years of constant botanical investigation. Prof. Macoun, too, tells me that with the exception of a small grove at Belleville these are the only specimens he has heard of east of Toronto. It is evident then that it is quite uncommon, and yet these trees were so thickly covered with galls that the leaves in many instances had more than a dozen galls on their undersides, and had much more the appearance of bunches of berries than of foliage. How did these small insects which only feed on this tree traverse so great a distance from one locality to another? The gall is mammiform, having a thick fleshy outer coat, and inside this a thin woody one; the cavity inhabited by the flat larva is narrow, and the centre of the gall is filled up with a solid mass of the same nature as the outside wall. When the pupæ are mature they work their way up through the top of the galls, which are all on the underside of the leaves, and come out on the upper surface.

The other genus in this division is *Aphis*. These exceedingly injurious insects which attack almost every form of vegetation, are too well known to need any elaborate description. The word *Aphis* is derived from a Greek word meaning to exhaust. Although most of these insects are of small size, very few exceeding one or two lines in length, yet they make up for their want of size by their vast numbers; the rapidity with which they increase is almost beyond credence. "Réaumur has proved that one individual in five generations may become the progenitor of nearly six thousand millions of descendants." (Harris, p. 235).

In the autumn the perfect Aphides pair, and the female lays an egg on the branch of a tree which hatches the next spring. The newly-born larva immediately begins its work of depredation, piercing the young leaves and shoots with its sharp beak. It grows rapidly and soon arrives at maturity. The Rev. J. G. Wood, in "Insects at Home," gives the following concise history of their lives:—"These insects are prolific almost beyond belief. As a general rule, insects lay eggs which are hatched, pass through the state of larva and pupa, and then become perfect insects. But the Plant-lice go on a very different plan. Sometimes as if to show that they are amenable to law, they do lay eggs; but this is the exception and not the rule, which is somewhat as follows, though varied every now and then by these most eccentric of insects: A female Aphis takes her place on a branch —say of the rose—plunges her beak into the tender bark and begins to suck the sap. After a short time she begins to produce young Aphides at an average of fourteen per diem. These young creatures are just like their mother, only less, and immediately follow her example by first sucking the sap of the plant and then producing fresh young. As to the opposite sex it is no business of theirs. The extent to which this peculiar mode of increase (gemmation) can be carried may be imagined from the fact that a single female Aphis, isolated from the other sex, began to produce prolific females, which, in their turn, produced others, and so on for four years, during the whole of which time not a male Aphis had been suffered even to approach them. It is in consequence of this remarkable mode of production that the twigs and buds become so rapidly covered with Aphides, the quickly succeeding generations crawling over the backs of their predecessors so as to arrive at an unoccupied spot of bark in which they can drive their beaks. Thus, at the beginning of a week, say on Monday, a rose-tree may be apparently free from Aphides, or have at the most six or seven of the 'blight' upon it, but by Thursday the whole plant will be so thickly covered with Aphides that scarcely a particle of the bark can be seen."

No part of a plant seems to be exempt from their attacks; driving their sharp beaks through the epidermis, they suck the sap from the leaves, the young twigs, the roots, and even the rough bark of the stem. A good represensation of a too common species, *A. mali*, the apple blight, is given at Fig. 90, and illustrates the structure of most of these insects; we have the winged male of the natural size and the same with the female magnified. The best remedy for all the small insects which affect the bark and foliage of trees, is undoubtedly a frequent application of a solution of whale oil soap thrown on to the foliage by means of a syringe. The bark-lice which swarm on apple-trees in the autumn may be easily cleaned off by means of a thorough scrubbing with soap-suds; the addition of flour of sulphur to this mixture will prevent fungoid diseases making way where the Aphides have injured the bark. Many of the species make galls on different plants as on the poplar. The injuries done by these minute flies, I have said, is very great. Kirby and Spence state that the damage done to hops alone in England often made as much difference as £200,000 in the duty on hops in one year. I have myself occasionally seen in the south of England, what gave promise of being a splendid crop of hops, rendered worthless by a species of Aphis, in the short period of about a fortnight. It is to this family that the dreaded Phylloxera belongs which has absolutely rendered the cultivation of the vine impossible in some parts of France, and I know from personal information that a large grape-grower in one of the best champagne districts in that country had, in 1880, on account of this insect, simply to give up vine-growing, grub up his vineyards, and burn the vines.

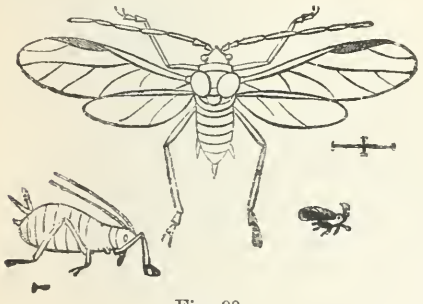


Fig. 90.

Our President has so ably described this insect in its different forms in several papers during the past year or two that further reference to it is unnecessary.

In the last division, Monomera, which have only one joint in the tarsus, we find those extraordinary insects the Coccidæ, or Scale insects, as they are called, on account of the peculiar shape of the females, which in different species take different forms; some are oval and more or less convex, some shaped like a boat turned bottom upwards, some kidney shaped or globular; and one of the best known, the oyster-shell bark louse, takes the shape its name implies. Westwood remarks truly: "These form one of the most anomalous tribes of insects with which we are acquainted, and which already prove that annulose animals may exist, which become more and more imperfect as they approach the winged state, and which in that state lose all trace of articulation in the body as well as of articulated limbs (as in the female Cocci), leaving, in fact, inert and fixed masses of animal matter, motionless and apparently senseless, and which resemble nothing more nearly than the vegetable excrescences called galls."

The females undergo only a partial transformation, and never possess wings; the males on the other hand have a complete metamorphosis, with a quiescent pupal state, in which the rudiments of the antennæ, wings, etc., are perceptible, and have the legs arranged on the breast with the anterior pair directed forwards, a peculiarity not occurring in any other insects. The mature female retains the beak, but does not acquire wings, and the male has two wings, but the mouth parts disappear.

The eggs are hatched beneath the protecting scale, which was formerly the mother's body; they soon make their escape, as active little six-footed grubs, with slender beaks and two long bristles at the end of the body; and in some species, as *C. adonidum*, the Mealy Bug of the greenhouse, are covered with a white powdery covering. Most species, however, are naked. At this stage both sexes are alike.

As soon as they leave the scale they move along the branches towards the tip, and fix their beaks in the bark of the twig. From this time they remain motionless, fastened to the epidermis of the plant by means of small white downy threads emitted from the undersides of their bodies, they lose the caudal bristles, a scale forms over them, and they increase rapidly in size.

In this condition they pass through the winter, and it is not until the following spring that the sexes are developed. Some of the scales will then be noticed to increase in size, and these are the females. Under the smaller scales the transformations of the males take place, and they are remarkably different from those of the females, for in this sex there is what is not found in any other member of this order, a complete metamorphosis. These males remain under the scales (their outer skins) from which they detach themselves, until they evolve as perfect insects. After the insects have paired, the body of the female dries up, the whole substance apparently being consumed by the enormous number of eggs she lays. Many of these insects are exceedingly injurious to vegetation, and are difficult to combat. We have several species in Canada, but there is little positive knowledge concerning them. It is a very curious thing how they migrate from one tree to another. They will appear suddenly on trees which have been without them for years. This year, and from the amount of downy material in which it envelops its eggs, a very conspicuous species has appeared for the first time on a Virginian creeper near my house. There were, perhaps, a dozen females this year, and on examining the young shoots a few days ago, I found them well stocked with the half-grown scales. This species seems to answer the description of one Harris mentions on page 256, a thorough investigation of which he was prevented from carrying out by its premature destruction by fire, together with the grape-vine upon which it was feeding.

The *Aspidiotus conchiformis*, oyster-shell bark louse, attacks many different trees, but chiefly the apple. It has also been found on the currant, plum, pear, cherry, and apricot. Fig. 91 represents a twig of an apple tree covered with these scales. This is becoming a very injurious pest in Ontario, and unluckily gardeners seem to have got an idea that nothing can be done to stop its ravages, so let it take its chance. I have been frequently told that it was useless to apply the soap wash, on account of the insect being protected by a scale. This of course is not the case. If a strong mixture of whale-oil soap, with tobacco in it, is syringed on the trees four times through the month of June, it can be kept well in hand, because then the young larvæ are unprotected by a scale.

Fig. 91.

Although the greater number of the Coccidæ are so injurious, yet there are some among them which produce commodities of very great commercial value. It is from the female scales of *C. lacca*, a species of this family which attacks *Ficus indica*, that the Indian product lac is obtained. This substance has many uses in the economic arts; it is the chief ingredient in sealing wax and several varnishes, and is also the basis of French polish. In India it is mixed with sand to form grindstones; dissolved in water and mixed with ivory black it makes a good ink. It is also from this insect that the colouring matter called lac-lake is prepared, which has been used as a substitute for cochineal. The East India Company are said to have saved in a few months $70,000 in the purchase of scarlet cloth dyed with a mixture of this colour and cochineal conjointly, and this without any inferiority in the colour obtained. These scales are known as stick-lac when they are unseparated from the twigs upon which they formed; seed-lac when removed and pounded, and a part of their colouring matter extracted in water; lump-lac when melted down into cakes; and shellac when strained and allowed to harden in thin laminæ or flakes. But the most valuable of these insects is, perhaps, the Cochineal (*C. cacti*), which attacks a kind of indigenous cactus (Opuntia cochinillifera) found in Mexico where it is called nopal, and which is cultivated in plantations called nopalleiros, for the express purpose of feeding these insects. It is one of the most remunerative industries of the country. It has been calculated that 70,000 dried insects are required to make a pound of cochineal. In 1866 England imported 32,757cwt., valued at £594,818, and exported 21,238cwt., the annual consumption being about 12,000cwt. The price in 1870 was about 3*s.* a pound. In 1871 the imports into the United States were 1,849,842lb, valued at $1,184,255. Many attempts have been made to introduce this insect into other countries. The East India Company even offered a reward of £6,000 to anyone who would introduce it into India. It was introduced into the Canary Islands about 1830,

and after the failure of the grape in 1850, became the principal article of export. In 1870 the exports reached 6,000,000lb, worth on the spot $3,200,000. In 1844 the French succeeded in introducing it into Algeria, and the Dutch have introduced it into Java.

The literature on this family is most meagre, and, in fact, until Prof. Comstock published his article in the United States Department of Agriculture Report of 1880, nothing systematic of any consequence had been done. This gentleman is making a thorough investigation of this difficult but interesting subject, and as it is necessary to have a large series of specimens, it is in the hands of everyone to assist him, for if any person who noticed a plant infested by these insects were to send a note and specimens to him I am sure he would be glad to receive them, and they might possibly do much good by putting into the hands of a specialist, species unknown to science, upon which he would experiment in the same careful and thorough manner which is so manifest in all his work. It is satisfactory to know that after a great number of experiments, Prof. Comstock has found that, for all these insects the most effectual remedy is that very economical one—common soap.

APPENDIX TO REPORT

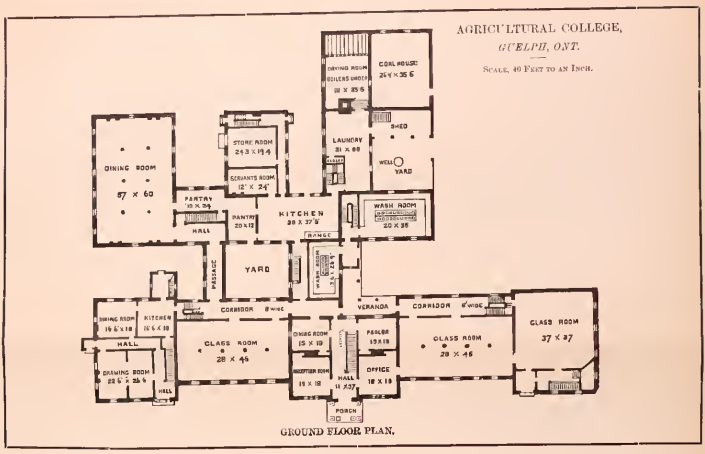
OF THE

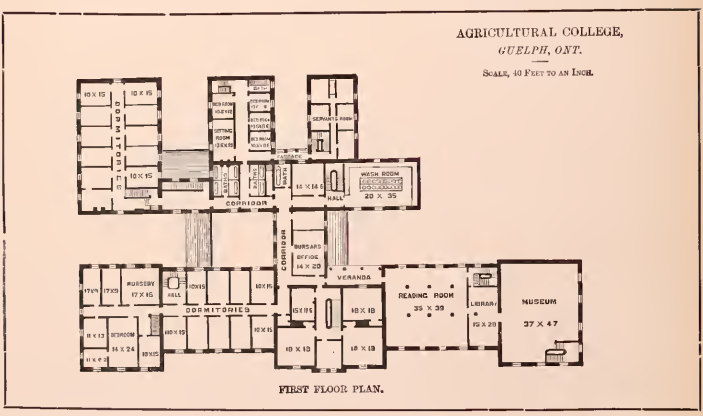
Commissioner of Agriculture and Arts.

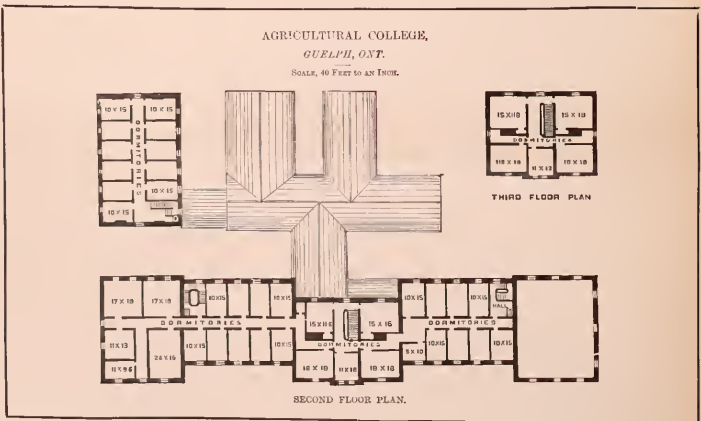
APPENDIX (E).

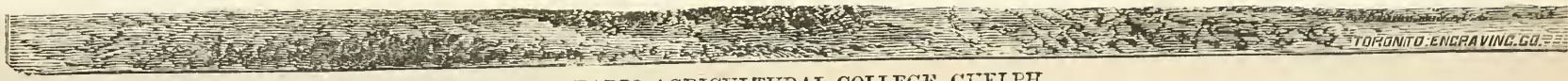
REPORT OF THE ONTARIO AGRICULTURAL COLLEGE, GUELPH, FOR THE YEAR COMMENCING 1st JANUARY AND ENDING 31st DECEMBER, 1882.

ONTARIO AGRICULTURAL COLLEGE, GUELPH.









ONTARIO AGRICULTURAL COLLEGE, GUELPH.

REPORT OF THE PRESIDENT

OF THE

ONTARIO AGRICULTURAL COLLEGE,

GUELPH,

FOR THE

YEAR COMMENCING 1st JANUARY AND ENDING 31st DECEMBER,

1882.

Ontario Agricultural College,
Guelph, 2nd January, 1883.

To the Honourable S. C. Wood,
Commissioner of Agriculture for the Province of Ontario:

Sir,—In soliciting your attention to the Eighth Annual Report of the Ontario Agricultural College and Experimental Farm, I am pleased to be able to speak of steady, uninterrupted work and substantial progress in the several departments of the Institution. We are well aware of our deficiencies, and not unwilling to acknowledge more or less imperfection in our management. Nevertheless, we believe it will be generally admitted that the Institution is doing a good work—a work of real value to the country; and, while self-praise would be most unseemly and self-congratulation a matter of doubtful propriety, I think we are justified in saying that the rivulet whose source was so insignificant, and early course interrupted by so many obstacles, has become a very considerable stream, whose waters are flowing silently on and may ere long expand into a river that shall bear fertility, wealth, and happiness to thousands.

If nothing else, it may be fairly claimed that the attention given to the study and practice of agriculture and kindred subjects at the Ontario Agricultural College during the last seven or eight years, has contributed largely towards creating and arousing an interest in the matter of agricultural education throughout the Province, which interest I believe is destined to produce the most beneficial results on the welfare of the people at large. The farmers have begun to realize that there is no art, profession, or occupation which demands more careful study than agriculture; that special preparation is needed no less for the pursuit of agriculture than for law, medicine, or divinity; and that some provision should be made for teaching the elements of so important a subject in all our rural Public Schools. The question has been discussed from time to time, and its importance set forth with more or less ability, till at length the Minister of Education has taken

the first step towards carrying out the wishes and suggestions of the farming community. Agriculture has a place on the Public School programme of studies; and, although the subject is optional, the time is not far distant when every farmer's son will have the opportunity of learning, at little or no expense, some of the principles that underlie the various operations of the industry by which he has to make a living for himself and those that may be dependent on him.

MANAGEMENT.

The general management of the Ontario Agricultural College and Experimental Farm is divided between the President and the Farm Superintendent, who are to a large extent independent of each other. The former has full authority and control inside, and the latter outside. Each is required to work for the other; but neither is responsible for the discharge of his duties to anyone but the Commissioner of Agriculture.

The work outside is divided into five departments—

I.—The Farm Department.
II.—The Live Stock Department.
III.—The Horticultural Department.
IV.—The Mechanical Department.
V.—The Experimental Department.

For all these my colleague Professor Brown has hitherto been responsible. He has hired the men, directed the foremen, bought, sold, and done whatever else he has thought necessary for the accomplishment of the objects for which the Institution was founded; and his report, in Part VI. of this volume, contains an able and exhaustive statement of the work done in all the above departments during the past year.

The inside work, on the other hand, may be considered under three heads—

I.—The Course of Instruction in the College.
II.—The Boarding House and College Buildings.
III.—The Business Department.

For these I am directly responsible to the Commissioner of Agriculture, and indirectly to the ratepayers of the Province at large—responsible not only for the discipline and efficiency of the first, but also for the economy and general management of the second and third. Hence I beg to report as follows:—

I.—THE COURSE OF INSTRUCTION IN THE COLLEGE.

Before proceeding to the work of 1882, I shall give the sessions and terms into which the year is divided, a list of the subjects taught, and the names of the professors and lecturers, with the work allotted to each; after which I shall speak of the year's operations as a whole, and then of each term separately.

The scholastic year commences on the 1st October, and ends on the 31st August. It is divided into two sessions and each session into two terms.

Sessions.

Winter Session, embracing the Fall and Winter Terms—1st October to 31st March.

Summer Session, embracing the Spring and Summer Terms—16th April to 31st August.

Terms.

Fall Term—1st October to 22nd December.
Winter Term—5th January to 31st March.
Spring Term—16th April to 30th June.
Summer Term—1st July to 31st August.

Subjects Taught.

The regular course of study extends over a period of two years and includes the following subjects:—

First Year.—Agriculture, Live Stock, Inorganic Chemistry, Organic Chemistry, Geology and Physical Geography, Structural and Physiological Botany, Physiology, Zoology, Veterinary Anatomy, Veterinary Materia Medica, English Literature and Composition, Book-keeping, Arithmetic, and Mensuration.

Second Year.—Agriculture, Live Stock, Arboriculture, Agricultural Chemistry, Meteorology, Systematic and Economic Botany, Entomology, Horticulture, Veterinary Pathology, Veterinary Surgery and Practice, English Literature, Political Economy, Book-keeping, Mechanics, Levelling and Surveying.

Method of Instruction.

The method of instruction is chiefly by lectures. Authors are read and studied in connection with the lectures on English Literature, Political Economy, and Systematic Botany; but in the other subjects, text-books are not used in the class-room, except for occasional reference.

The Staff.

1. James Mills, M.A., *President.*

English Literature and Political Economy.

2. William Brown, C.E., P.L.S.

Agriculture, Live Stock, and Arboriculture.

3. R. B. Hare, B.A., Ph. Dr.

Inorganic, Organic, Agricultural and Analytical Chemistry; Geology; Physical Geography; Meteorology.

4. J. Playfair McMurrich, M.A.

Physiology; Zoology; Structural, Physiological, Systematic, and Economic Botany; Horticulture; Lectures on English.

5. Frederick Grenside, V.S.

Veterinary Anatomy, Pathology and Materia Medica; Practical Handling and Judging of Horses.

6. Wm. Nattress, M.B., 1st Class A Provincial Certificate.

Arithmetic, Mensuration, Mechanics, Levelling, Surveying, and Book-keeping; Lectures on English.

THE YEAR 1882.

The history of the College has not been characterized by anything special during the past year. The work in the different departments has gone on as usual, and the progress has been quite as satisfactory as at any former period. There has been little or no change in the class-room work, except the introduction of regular lectures on Horticulture, and the organization of a special class for the study of Live Stock and Veterinary Science.

Four new cottages have been erected, and the grounds in front of the College have been very much improved under the direction of a Special Committee appointed by the Fruit Growers of Ontario. We have had a large number of visitors from home and abroad; and the applicants for admission at the commencement of each session have been more than it has been possible for us to accommodate.

Students are admitted twice a year—on the 1st October and the 16th April. Some of those who come to the College in October return home to work on their own farms in April; and others are then admitted to fill the vacancies. Hence the total number of those whose names are registered during the year is larger than that in attendance at any particular time. The number on the roll last year was 206—1 from the United States, 1 from Cyprus, 1 from Constantinople, 1 from Manitoba, 1 from Prince Edward Island, 2 from the West Indies, 3 from Ireland, 3 from Wales, 4 from Scotland, 6 from New Brunswick, 7 from Nova Scotia, 12 from the Province of Quebec, 20 from England, and 144 from Ontario, *i. e.*, 70¼ per cent. of residents, and 29¾ per cent. of non-residents. See College Roll, appendix 1.

Counties, &c.	*Students.*	*Counties, &c.*	*Students.*
Brant	6	New Brunswick	6
Bermuda	1	Norfolk	1
Bruce	3	Northumberland	1
Carleton	5	Nova Scotia	7
Cyprus	1	Ohio	1
Durham	1	Ontario	1
Elgin	7	Ottawa	14
England	20	Oxford	9
Frontenac	1	Peel	3
Grey	5	Perth	7
Glengarry	4	Peterborough	3
Haldimand	2	Prince Edward	1
Halton	1	Prince Edward Island	1
Hamilton	5	Quebec	3
Huron	4	Simcoe	10
Ireland	3	Scotland	4
Kent	2	St. Catharines	2
Kingston	5	Toronto	5
Lambton	3	Turkey	1
Lanark	2	Waterloo	2
Leeds	3	Wales	3
Lincoln	1	Welland	1
London	1	Wentworth	3
Manitoba	1	Wellington	7
Middlesex	1	West Indies	1
Montreal	9	York	9

Total number of students in 1882	206
Number of Ontario counties represented	31

From these figures it will be seen that the County of Simcoe had the largest representation in the College last year—10 in number. The County of York had 9, Oxford 9, Elgin 7, Perth 7, Wellington 7, Brant 6, Carleton 5, and Grey 5; the City of Ottawa 14, Toronto 5, Hamilton 5, Kingston 5, and St. Catharines 2.

It may also be proper to observe that the College is patronised by members or adherents of almost every religious organization in the Dominion. Last year no less than sixteen of the recognized denominations were represented in our class-lists, as follows:—

Religious Denominations.

Episcopalian	94	Lutheran	2
Presbyterian	44	Plymouth Brethren	2
Methodist Church of Canada	34	United Brethren	1
Baptist	7	Quaker	1
Roman Catholic	7	Unitarian	1
Congregational	4	Jews	1
Episcopal Methodist	3	Universalist	1
Primitive Methodist	3	Swedenborgian	1
		Total	206

Lectures commenced on the 1st October and continued throughout the first three terms of the scholastic year 1881–'82—from the 1st October to the 30th June; during which time all our regular students were engaged in class-room work and manual labour alternately—three hours a day having been spent at the former, and from three and a half to five at the latter. To this were added five hours in two weeks for set-up drill and gymnastics, under Sergeant-Major Clarke, the very efficient drill instructor of the Ontario and Wellington Field Batteries; so that the daily routine of every student in the regular course, for nine months of the year, was—

Lectures in the College, three hours a day (excepting Saturdays).
Manual labour outside, three and a half to five hours a day, according to the season of the year.
Study in room, two hours a day.
Drill and gymnastics, one hour a day (for five days of every alternate week).

While the first year students were at lectures in the College, the second year students were employed outside. Those who went out to work in the forenoon, came in for lectures in the afternoon, and *vice versa*. Thus the theoretical work inside and the practical work outside went on simultaneously during the Fall, Winter and Spring Terms. The Summer Term (1st July to 31st August) was devoted entirely to work in the outside departments—the farm, the live stock, the garden, the carpenter-shop and experiments.

In order to place systematically and clearly before the readers of this report an outline of the literary work done in the Institution, I have drawn up the following syllabus of lectures delivered by the professors in the several departments and sub-departments of study during the scholastic year, commencing on the 1st October, 1881, and ending on the 31st August, 1882:—

OUTLINE OF CLASS-ROOM WORK.

Scholastic Year 1881-82.

(*1st October to 30th June.*)

FIRST YEAR.

Fall Term—1st October to 22nd December.

Department 1.—Agriculture.

Introductory.—Ancient and modern agriculture; agricultural literature; arts and sciences affecting agriculture; different kinds of farming.

Reclamation of Land.—Clearing, stumping, stoning, fallowing, etc.

Soils.—Origin and distribution of soil; natural conditions of soil and plant; examination and classification of soils; physical and chemical properties of each kind.

Rotation in Cropping.—Importance and necessity of rotation : principles underlying it ; rotations suitable to different kinds of soil ; examination and criticism of different systems of rotation.

Buildings.—Location of house, barn and stables ; framing a building ; stables for horses, sheep and cattle ; arrangement of farm buildings.

Implements and Machinery.—Principles in construction of implements and machinery; points to be aimed at ; classification, examination, and description of the same.

Miscellaneous.—Roads, lanes, fences, wells, etc.

Department 2.—Science.

Chemical Physics.—Matter; accessory and essential properties of matter; attraction; various kinds of attraction—cohesion, adhesion, capillary, electrical and chemical; specific gravity ; weights and measures ; heat, measurement of heat, thermometers, pyrometers, specific and latent heat ; sources, nature and laws of light ; spectrum analysis.

Inorganic Chemistry.—Scope of subject ; elementary and compound substances ; chemical affinity ; symbols ; nomenclature ; combining proportions by weight and by volume ; atomic theory ; atomicity of the most important elements ; oxygen and hydrogen ; water—its nature, functions, decomposition and impurities ; nitrogen ; the atmosphere—its composition, uses and impurities ; ammonia—its sources and uses ; nitric acid and its connection with plants ; carbon ; combustion ; carbonic acid and its relation to the animal and vegetable kingdom ; sulphur and its compounds ; manufacture and uses of sulphuric acid ; phosphorus ; phosphoric acid and its importance in agriculture ; chlorine—its bleaching properties ; bromine ; iodine ; silicon ; etc.

Zoology.—Definition of terms morphology, physiology, embryology, etc.; distinctions between animate and inanimate objects ; life ; distinctions between plants and animals ; definition of general terms ; development ; basis of classification ; characters of the various classes, with a more detailed and special account of the porifera or sponges ; actinozoa, including the formation of coral islands ; trematoda, including the "liver-fluke" ; cestoda, with a description of the life-history of the common tape-worm, and of the form causing "staggers" in sheep ; nematoda, including thread worms, trichina, wheat anguillula, cause of gapes in chickens, etc; acanthocephala ; oligochæta—formation of mould by earth-worms ; hirudinea ; lamellibranchiata, including edible molluscs and pearl fisheries ; gasteropoda ; cephalopoda.

Department 3.—Veterinary Science.

Anatomy and Physiology of the horse, ox, sheep and pig ; osseous system, muscular system, syndesmology, plantar system, and odontology.

Department 4.—English.

Lectures on Composition.—The sentence, the paragraph, and the period ; capitals and punctuation ; style—its qualities and varieties. *Exercises in Composition.*

English Classics.—Critical study of Goldsmith's "Deserted Village."

Department 5.—Mathematics.

Arithmetic.—Review of subject, with special reference to farm accounts ; tables of weights and measures discussed ; interest, discount, stocks and partnership.

Mental Arithmetic.—Calculations in simple rules, fractions, and compound rules.

FIRST YEAR—(Continued).

Winter Term—5th January to 31st March.

Department 1.—Agriculture.

Breeding, rearing, and feeding of animals. Points to be considered in deciding what kind of animals to keep.

Horses.—Different breeds of horses, and leading characteristics of each; type of horse required for farm work; breeding, feeding and general management.

Cattle.—History and characteristics of Shorthorns, Herefords, Polled Angus, Ayrshires, Jerseys, Devons, Galloways, etc.; grade cattle; milch cows—points of a good milch cow; breeding generally, cross-breeding, in-and-in breeding; pedigree.

Sheep.—Breeds of sheep generally considered; long-woolled sheep; medium-woolled sheep; short-woolled sheep; crosses between different breeds compared; texture, quality, quantity, and uses of different kinds of wool.

Swine.—Characteristics of various breeds; management of sows; stores; bacon-curing, etc.

Department 2.—Science.

Inorganic Chemistry.—Subject continued from fall term.

Organic Chemistry.—Constitution of organic compounds; alcohols, aldehydes, acids and their derivatives; formic, acetic, oxalic, tartaric, citric, lactic, malic, uric and tannic acids. Constitution of oils and fats—saponification; sugars, starch, cellulose; albuminoids, or flesh formers, and their allies; essential oils; alkaloids—morphine and quinine; classification of organic compounds.

Zoology.—Study of various classes continued; arthropoda, with special attention to structure and habits of the arachnida, acarina and insecta; general structure of the vertebrata; distinctions between vertebrata and invertebrata; pisces; amphibia; reptilia—treating especially of the snakes and turtles; aves—habits and appearance of the more important insectivorous birds; mammalia, with special attention to the orders containing useful and domestic animals; anthropomorpha; man.

Lectures illustrated by specimens, diagrams, and drawings on the black board.

Department 3.—Veterinary Science.

Veterinary Anatomy.—Anatomy and physiology of the horse, ox, sheep and pig—digestive system, circulatory system, respiratory system, urinary system, nervous system, sensitive system, generative system, tegumental system.

Department 4.—English.

Lectures on Composition continued.—Common mistakes in speaking and writing discussed and corrected; most important figures of speech defined and illustrated.

Exercises in Composition continued.—Exercises in synthesis; abstracts of speeches and essays; letter writing.

English Classics.—Committing to memory and critical study of Cowper's "Task," Book III.

Department 5.—Mathematics and Book-keeping.

Arithmetic.—Equation of payments; percentage; profit and loss; stocks; partnership; alligation; exchange.

Book-keeping.—Business forms and correspondence; general farm accounts; dairy, field and garden accounts.

FIRST YEAR—(Continued).

Spring Term—16th April to 30th June.

Department 1.—Agriculture.

Preparation of Soil.—Modes of preparation for different crops, as wheat, barley, oats, rye, pease, maize; modes suited to various kinds of soil.

Seeds and Sowing.—Testing the quality of seed; changing seed; quantity of seed per acre; methods of sowing.

Improvement of Lands.—Ordinary cultivation; subsoiling in some cases; fallowing; draining; manuring. Farm yard manure, and management of the same; the properties, application and uses of artificial manures—lime, plaster, salt, bone-dust, superphosphates, etc.

Roots.—Cultivation of roots and tubers—turnips, mangolds, carrots, potatoes; effects of each kind on soil.

Green Fodders.—Tares, lucerne, sainfoin, prickley comfrey, clovers, grasses; the cultivation and management most appropriate for each.

Management of pastures; harvesting and preparing crops for markets or one's own use: crops of current year examined.

Department 2.—Science.

Geology.—Connection between geology and agriculture; classification of rocks—their origin and mode of formation, changes which they have undergone after deposition; fossils—their origin, inferences from their presence in rocks; geological periods and the characteristics of each. Geology of Canada, with special reference to the nature and economic value of the rock deposits; glacial period and its influence in the formation of soil. Lectures illustrated by numerous diagrams and specimens.

Physical Geography.—Scope of the subject—earth's place in space, external and internal conditions, atmosphere, ocean, land; superficial configuration of Ontario; theory of springs; classification of lakes; zones of animal and vegetable life.

Botany.—Derivation and definition of word; definition of morphology; vegetable physiology; botanical geography; palæophytology; history of the growth of the science; structure of plant—cells as individuals, cells aggregated into tissues; fibro-vascular bundles; roots—structure and physiology; stem—structure in exogens and endogens, growth of stem, branching, varieties of stem; leaves—structure, chlorophyll, stomata, hairs, shape, venation, compound leaves, phyllotaxis; flower—arrangement, structure, calyx, corolla, stamens, pistils, foliar nature of parts, fertilization, natural provisions for cross-fertilization, development; fruit—classification of fruits; germination of seeds. Physiology—proximate principles of plants; nutrition; metastasis; insectivorous plants; respiration; motion; heliotropism and geotropism; irritability; influence of temperature.

Lectures illustrated by specimens, diagrams and drawings on the black board.

Department 3.—Veterinary Science.

Materia Medica.—The preparation, doses, action, and uses of about one hundred of the principal medicines used in veterinary practice.

Department 4.—English.

Lectures on the subject, and class-room exercises in business correspondence, etc.

English Classics.—Committing to memory and critical study of Scott's "Marmion," Cantos V. and VI.

Department 5.—Mathematics.

Mensuration.—Mensuration of surfaces—the square, rectangle, triangle, trapezoid, regular polygon, circle, sector, segment, etc. Special application to the measurement of lumber. Mensuration of solids—tethrahedron, cube, prism, cylinder, spherical segment, spherical zone, parabolid, frustum of parabolid, spheroid, circular segment of spheroid, etc. Special application to the measurement of timber, earth, etc.

SECOND YEAR.

Fall Term—1st October to 22nd December.

Department 1.—Agriculture.

Experimental Plots.—The results of last season's experiments with wheat, oats, barley, peas, grasses, clovers, roots, etc.; liability to disease; effects of various manures on different crops; growth of plants, etc.

Farm Management.—Detailed account of the treatment of each field; results from different kinds of seed and soil; effects of manure; harvesting, storing, and threshing of crops; fall ploughing; subsoiling, etc.

Stock Feeding.—Value of feeding materials; estimate for winter keep of live stock; housing, feeding, and fattening; points to be observed in selecting animals for fattening; feeding experiments; common diseases of animals; management of animals on pasture; value of green fodder. Dairy management and cheese-making.

Department 2.—Science.

Agricultural Chemistry.—Connection between chemistry and agriculture; the various compounds which enter into the composition of the bodies of animals; the chemical changes which food undergoes during digestion; chemical changes which occur during the decomposition of the bodies of animals at death; the functions of animals and plants contrasted; food of plants, and whence derived; origin and nature of soils; classification of soils; causes of unproductiveness in soil and how detected; composition of different plants in relation to the soils upon which they grow; rotation of crops; preservation, development, and renovation of soils: manures classified, the chemical action of manures on different soils; chemical theories in reference to the action of superphosphates; the action of lime in the decomposition of double silicates; feeding of animals; classification of foods; chemical results in the use of different foods; points necessary to be considered in order to obtain the full value of artificial and natural foods.

Meteorology.—Relation of Meteorology to Agriculture; composition and movements of the atmosphere; nature and manipulation of the barometer, its importance in forecasting the weather; temperature, description of the various instruments used in its measurement and how to use them; solar and terrestrial radition; the influence of forests on climate; mists, fogs, clouds, rain, hail, and snow; description of instruments used in measuring rain and snow fall; velocity and direction of wind; causes affecting climate; influence of climate on vegetation.

Department 3.—Veterinary Science.

Pathology.—Osseous System.—Nature, causes, symptoms, and treatment of diseases of bone, as splint, spavin, ringbone, etc.

Muscular System—Nature, causes, and treatment of flesh-wounds, etc.

Syndesmology.—Nature, causes, symptoms, and treatment of bog-spavin, curb, and other diseases of the joints.

Plantar System.—Nature, causes, symptoms and treatment of corns, sand-crack founder, and other diseases of the foot.

Odontology.—Diseases of the teeth and treatment of the same.

Department 4.—English.

Lectures.—Etymological, syntatical, and rhetorical forms of the English language; history of its formation, its connection with other languages; rhetorical figures; their use and abuse; prose and poetic diction.

Composition.—Essay writing; familiar and business correspondence.

English Classics.—Critical study of Shakespeare's "Julius Cæsar."

Department 5.—Mathematics.

Statics.—The mechanical powers; friction; the steam engine; strength of materials; units of work; etc.

Drainage.—General principles; discharging water-ways; how, where, and when to commence draining; depth of drains and distances apart; furrow drains; draining followed by other improvements; drainage implements; levelling.

SECOND YEAR—(Continued.)

Winter Term.—5th January to 31st March.

Department 1.—Agriculture.

Laws affecting agriculture; capital required in farming, laying out of farm; general management and economy; measuring, levelling, and draining; permanent pastures; inventory and valuation; cost of production; buying, selling, and marketing; field experiments.

Management of cattle, sheep and other animals in winter; breeding generally considered; special management of ewes before, during and after the season of lambing; treatment of other animals in parturition: rearing of lambs, calves, and pigs; washing and dipping sheep, etc., etc.

Arboriculture.—Planting and attendance of forest trees, shade trees, etc.

Department 2.—Science.

Agricultural Chemistry.—Subject continued for Fall Term.

Entomology.—Importance of the study to agriculturists; natural checks to insect ravages; system of nomenclature; anatomy of insects—appendages, respiration, nutritive and nervous systems; metamorphosis; classification; beneficial and injurious insects—their habits and the best means of checking the ravages of the latter—lectures illustrated by specimens.

Department 3.—Veterinary Science.

Digestive System.—Nature, causes, symptoms, and treatment of spasmodic and flatulent colic, inflammation of the bowels, acute indigestion, tympanitis in cattle, impaction of the rumen, and many other common diseases.

Circulatory System.—Description of the diseases of the heart and blood vessels.

Respiratory System.—Nature, causes, symptoms, and treatment of catarrh, nasal-gleet, roaring, bronchitis; pleurisy, inflammation of the lungs, etc.

Urinary System.—Nature, causes, symptoms, and treatment of inflammation of the kidneys, etc.

Nervous System.—Nature, causes, symptoms, and treatment of lock-jaw, string-halt, etc.

Sensitive System.—Nature, causes, symptoms, and treatment of the diseases of the eye and ear.

Generative System.—Nature, causes, symptoms, and treatment of abortion, milk-fever, etc.

Tegumental System.—Nature, causes, symptoms, and treatment of scratches, sallenders, mallenders, parasites, and other diseases of the skin.

Department 4.—English and Political Economy.

Lectures.—Lectures on accuracy, purity, propriety, clearness, precision, strength, and grace; varieties of style described; false syntax discussed and corrected.

Composition.—Exercises in impromptu composition and letter writing continued.

English Classics.—The critical study of Shakspeare's "King Richard the Second."

Political Economy.—Utility; production of wealth—land, labour, capital; division of labour; distribution of wealth; wages; trades-unions; co-operation; money; credit, credit cycles; functions of government; taxation; etc.

Department 5.—Mathematics.

Dynamics.—Motion, forces producing motion, momentum, etc.

Hydrostatics.—Transmission of pressure; the hydraulic press; specific gravity, density; pumps, siphons, etc.

Road-Making.

SECOND YEAR—(Continued.)

Spring Term.—16th April to 30th June.

Department 1.—Agriculture.

Review of all past lectures with special drill on outside work. Reasons for management, etc.

Department 2.—Science.

Practical and Analytical Chemistry.—Chemical manipulation, preparation of common gases and reagents; operations in analysis—solution, filtration, precipitation, evaporation, distillation, sublimation, ignition, and the use of the blow-pipe; testing of substances by reagents; impurities in water; adulteration in foods and artificial manures; injurious substances in soils.

Quantitative analysis of soils, manures, and farm produce.

Systematic and Economic Botany.—Definition of the terms; importance of classification; requisites of a good classification; classification of plants, characters of the more important orders; description of source and preparation of the various economic products obtained from plants. The course was illustrated by a large collection of plants and also by practical field-work, in which various plants were examined, dissected, and classified by the students.

Horticulture.—Ontario as a fruit-growing country; influence of climate; soil, topography; source of our commoner fruits; improvement by selection; Van Mon's theory; cross fertilization—physiology, extent to which it can be carried; duration of cultivated varieties; grafting and budding—objects of operations, methods, extent to which operations can be carried; influence of graft on stocks; layering; propagation by suckers; propagation by pieces of root; pruning—objects of operation, physiology, root-pruning, other methods of producing fruitfulness; training—objects of operation, methods; transplanting—physiology, time of year to be practised, operation, mulching, manuring, laying in by the heels; winter care of plants; diseases of plants—produced by changes in the external conditions of plants, poisonous gases in the atmosphere or soil, growth of parasitic plants, injuries from insects; points to be considered in the selection of trees.

Department 3.—Veterinary Science

Materia Medica.—The preparation, actions, uses, and doses of medicines—continued from the Spring Term of the first year. Lectures on special subjects such as pleuro-pneumonia, the rinderpest, tuberculosis, etc.

Department 4.—English.

Lectures.—Taste, characteristics of taste, standard of taste; pleasures of the imagination—their sources, viz., the novel, the wonderful, the picturesque, the sublime, the beautiful; wit, humour, ridicule, etc.

Composition.—Business forms, correspondence, general letter-writing, etc.
English Classics.—The critical study of Milton's "L'Allegro" and "Il Penseroso."

Department 5.—Mathematics and Book-keeping.

Surveying.—Fields surveyed with chain and cross-staff; heights and distances found by the theodolite.
Book-keeping.—Review of previous work; laws relating to farming—deeds, mortgages, notes, etc., with laws relating thereto.

Having spoken thus briefly of the year 1882, as a whole, I now proceed to report more at length on the work of each term separately. As already intimated, the scholastic year commenced on the 1st October, 1881, and ended on the 31st August, 1882, while the financial year commenced on the 1st January and ended on the 31st December; and for this reason it is somewhat difficult to make our reports intelligible to ordinary readers. The following arrangement of the terms will, perhaps, illustrate what I mean:—

Scholastic Year	Fall Term (1881)	
	Winter Term (1882)	*Financial Year.*
	Spring Term "	
	Summer Term "	
	Fall Term "	

From this it will be seen that the financial year embraces the last three terms of one scholastic year and the first term of another. The scholastic year commences with the Fall Term, and the financial year with the Winter Term. Hence the confusion which arises in the minds of some.

The Fall Term of 1881, *i.e.*, the first term of the scholastic year, having been treated of in last year's report, I shall begin with

THE WINTER TERM OF 1882.

(5th January to 31st March.)

The students in attendance were those who had entered at the commencement of the Fall Term in October, 1881, or previous to that date—129 in number; and the work was to a large extent a continuation of the subjects begun at that time.

Lectures.

The term was ten weeks and two days long, exclusive of the time spent in examinations; and the lectures delivered to the first-year students were 156 in number, of one hour each—thirty-one on Agriculture, thirty-two on Chemistry, twenty-one on Zoology, twenty on Veterinary Anatomy, thirty-one on English Literature and Composition, and twenty-one on Arithmetic. The second-year students had a course of 136 lectures and spent twenty hours in the practical handling and judging of cattle, sheep and horses, under the supervision of the Veterinary Surgeon and the Professor of Agriculture. The lectures were as follows: Agriculture, twenty-one; Arboriculture, five; Agricultural Chemistry, thirty-one; Entomology, eleven; Political Economy, twenty-one; English Literature, ten; Veterinary Pathology, twenty-one; Dynamics and Hydrostatics, fifteen; Road-Making, six.

Course of Apprenticeship.

Regarding the course of apprenticeship in practical work, I may say that during the past year the students were sent regularly and, with few exceptions, systematically, to all the outside departments, *i,e.*, to the farm, the live stock, the garden, the carpenter-shop, and the experimental department; so that it was in the power of everyone who made a right use of his time to get a fair knowledge of whatever is to be learned in each department.

During the winter months it is sometimes difficult to find work of a kind suitable for the purposes of instruction. The experimental department furnishes but little employment; there is not much to do on the farm, and very little in the garden: consequently more time is devoted to the mechanical and live stock departments in the Winter Term than at any other season of the year. In this way the difficulty is to some extent overcome, and special opportunities are afforded the young men for learning the use of carpenters' tools, and acquiring a practical knowledge of the best methods of feeding and managing the ordinary farm animals.

Live Stock.

In this department, the first year students devoted three hours a week to the study of the characteristic points and peculiarities of the leading breeds of sheep, pigs, and horses, while the second year men spent one hour a week in handling, judging, and comparing the different breeds and varieties of sheep and cattle. The method of instruction was the same as usual, and may be described as follows:—

A specimen of some kind, say a Shorthorn steer, is brought into the lecture-room, which is so arranged with galleried seats that every student, while in his place taking notes, has a full view of the lecturer and all his movements. The different parts of the animal are first pointed out and named, such, for example, as the brisket, crops, loins, twist, etc. After this has been several times repeated, the students are called on to point out and name the several parts in presence of their class-mates. The lecturer then criticises the animal more closely, indicating the strong and the weak points, and giving his estimate of it as a whole. Afterwards several animals of different breeds are brought in together, and he proceeds to describe and illustrate what are considered the good points of an animal for beef and for milk, comparing and contrasting Shorthorns, Herefords, Aberdeen Polls, Devons, Galloways, Ayrshires, and Jerseys—breed with breed in regard to shape of frame, quality of flesh, feeding, beefing, milking, hardiness, and other properties. Much the same course is pursued with the different breeds of sheep. Cotswolds, Leicesters, Southdowns, Oxford Downs, Shropshire Downs, and Merinos are frequently examined in the class-room, and compared with one another as regards carcass, constitution, wool, mutton, feeding, hardiness, etc. Thus the instruction in this department is made in the strictest sense definite and practical.

Natural Science.

In the department of Natural Science I have to report as I did last year, that the course prescribed in the curriculum has been faithfully gone through; but that in Chemistry the results would have been better and much more satisfactory to all concerned, if the Institution had been provided with a good laboratory and apparatus suitable for making the experiments which constitute so large a part of the instruction in this important department. The professor did all that any chemist could do; but he was much hindered by the utter insufficiency of our eight by twelve laboratory and its scanty equipment.

The first year students, after completing the Inorganic Chemistry which they had studied throughout the Fall Term, took up the somewhat difficult but interesting subject of Organic Chemistry. A full course of lectures was delivered, embracing all the important organic compounds; and special attention was given to the nature and sources of sugar, starch, oils, fats, the albuminoids or flesh-formers, and other substances which have a more or less direct bearing on agriculture and stock-raising. At the same time they received lecturers from another professor on Zoology, the object of which was to give them

a general view of the whole animal kingdom, and thus make them more intelligent and appreciative students of particular parts of that kingdom under the heads of Entomology and Veterinary Science. While the students of the first year were thus employed, those of the second year were attending lectures on Agricultural Chemistry and Entomology. During the previous term they had learned the relation of Chemistry to Agriculture, and with this knowledge they now proceeded to study the nature and sources of plant food, the origin and properties of the different kinds of soil, their preservation and renovation, the causes of unproductiveness, artificial fertilizers and farm-yard manure, the chemical composition of various fodders, and the nutritive value of each. With such subjects as these, they were occupied three hours a week, and spent one hour a week in examining specimens of the various insects which infest our crops and fruits, and in studying the best known means of checking and preventing their ravages.

A more detailed account of the work in the several sub-departments under this head will be found in the reports of Dr. Hare and Professor McMurrich, Parts II. and III. of this volume. These reports, being more specific than anything I have said, are more interesting and instructive. They contain full information as to what is being done, and a number of suggestions regarding the work yet to be accomplished.

Veterinary Science.

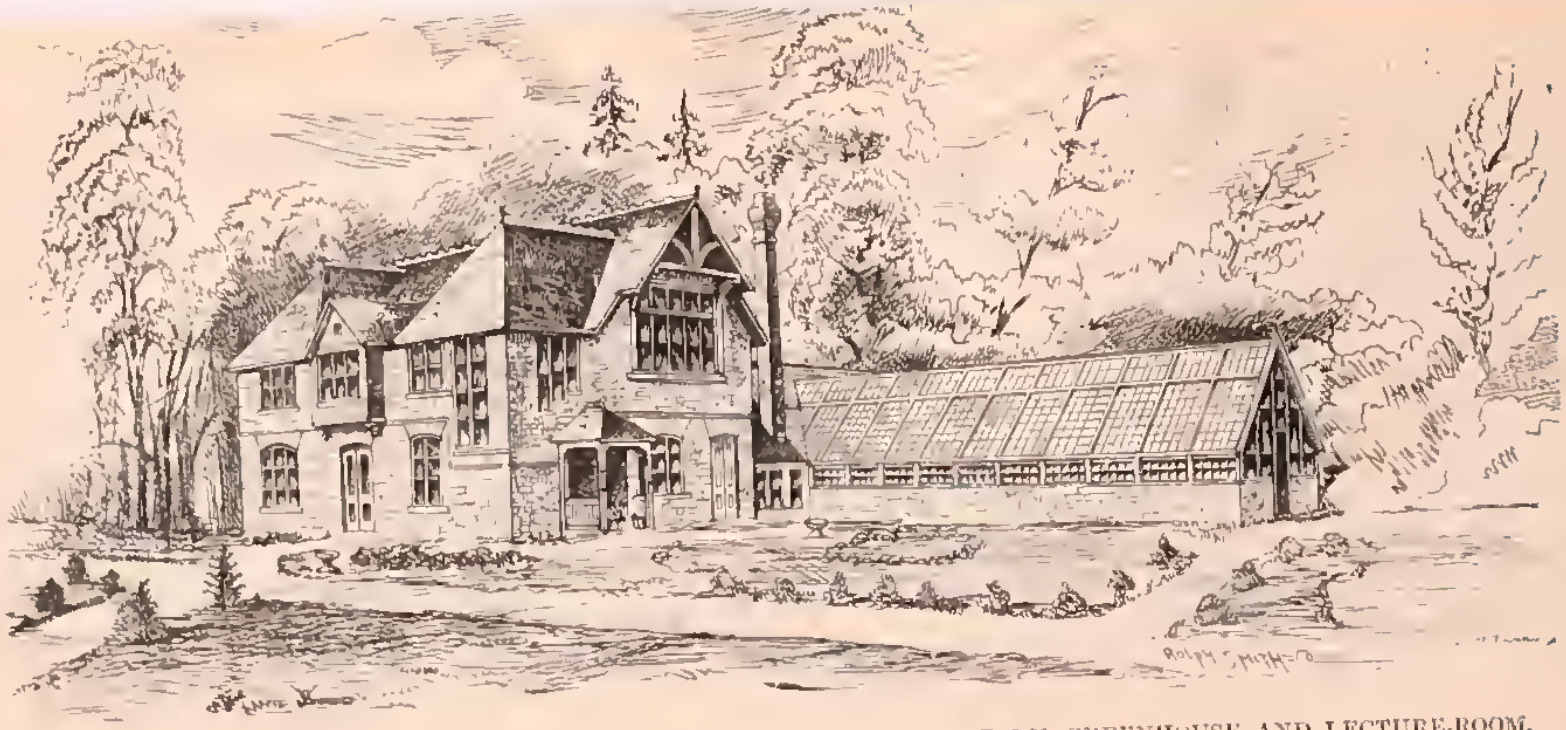
As will be seen from the syllabus of lectures given on a previous page, the Winter Term in the veterinary department is devoted to the anatomy, physiology, and pathology of the horse, ox, sheep, and pig. The lectures to the first year students were on the anatomy and physiology of these animals, and were illustrated by the complete skeleton of a horse and portions of other skeletons. The second year lectures discussed various diseases and their treatment, especially the common ailments of the horse, as spavin, ringbone, curb, founder, inflammation and such like ; and, for the purpose of making the instruction thoroughly practical, horses were regularly brought into the class-room and examined, first by the professor in presence of the class, and afterwards by the students themselves. Thus the veterinary surgeon was each day enabled to see whether his lectures were really understood or not by those to whom they were delivered ; and the work was heartily entered into and very much appreciated by the second year men, almost without exception.

English Literature and Political Economy.

Regarding this department, I have to say as I did last year, that our course of study is still the same, and the same subjects are emphasised. We spend no time on any of the ancient or modern languages, except English ; and not much on anything which has not a direct bearing on the ordinary duties of a Canadian farmer. The time may come when it will be proper to add Drawing, Elocution, and, perhaps, French or German to the list of studies ; but at present it seems wise to resist the temptation in that direction. We give all the subjects of the programme a fair share of attention, but lay most stress on Agriculture, Live Stock, Chemistry and Veterinary Science. Our primary aim is to make good practical farmers ; but we are not forgetful of the fact that it is no less important to make good citizens—to add some of the graces and refining influences of a broader culture, and thereby fit our students for filling positions of trust, influence, and respectability in Church and State.

The kind of education which enables a man to make the most of his abilities in the social circle, the municipality, or the political arena, is not got by confining the attention to any single subject, but by reading, writing and conversation, with the sharpening and refining influences of many studies. At the same time, I think there is nothing else which contributes so much to that end, and tends so directly to create and foster a taste for reading, as frequent practice in composition and the critical reading of selections from the best English authors ; and for this reason we devote all the time we can spare to exercises of that kind.

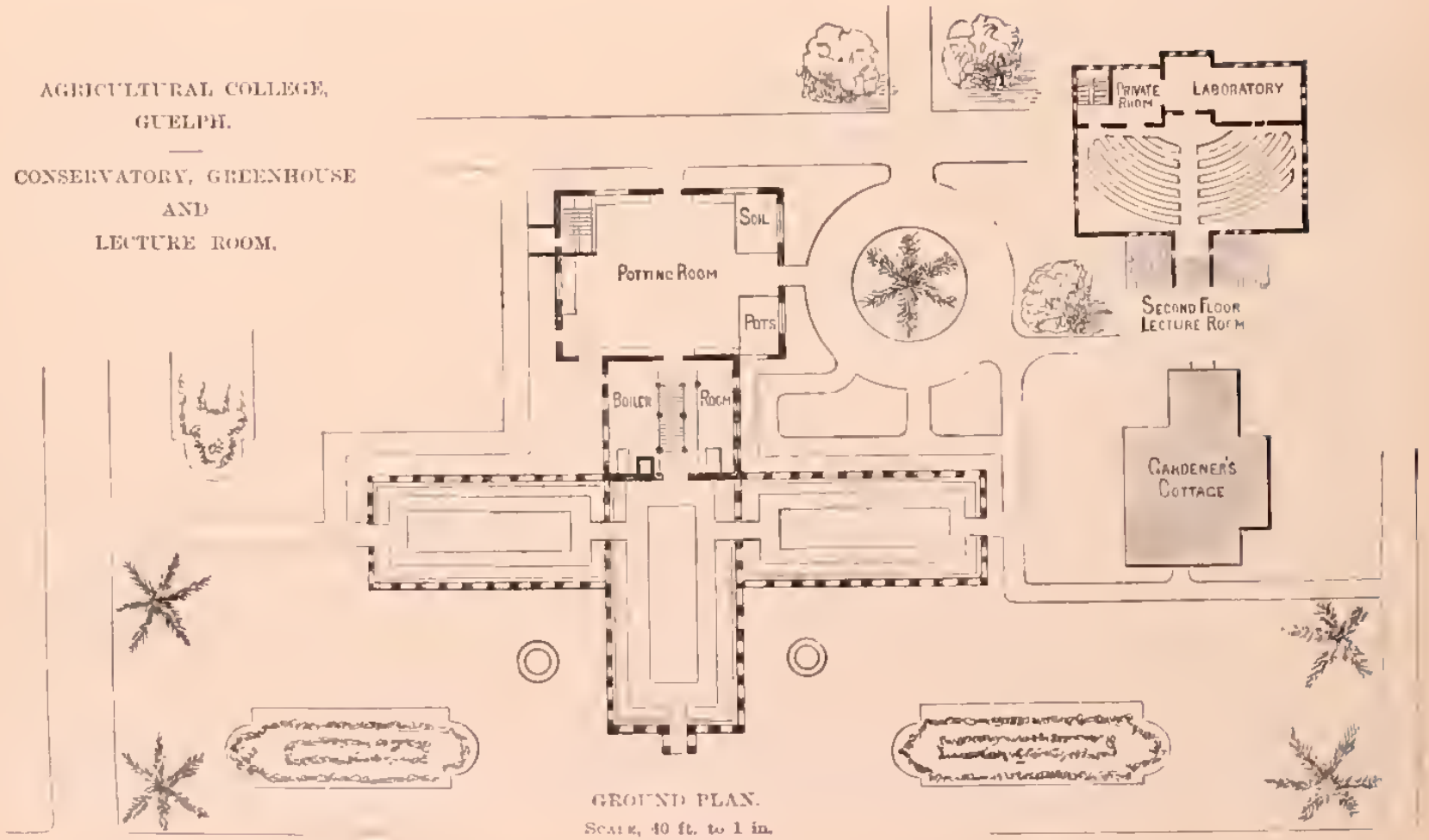
During the Winter Term of 1882, the first year students spent one hour a week in writing compositions, and two hours in the critical study of Cowper's "Task," book III.



AGRICULTURAL COLLEGE, GUELPH.—PERSPECTIVE VIEW OF CONSERVATORY, GREENHOUSE AND LECTURE-ROOM.

AGRICULTURAL COLLEGE,
GUELPH.

CONSERVATORY, GREENHOUSE
AND
LECTURE ROOM.



GROUND PLAN.
Scale, 40 ft. to 1 in.

The second year men read Shakespere's "Julius Cæsar," and a part of "King Richard the Second;" and spent two hours a week on the important subject of Political Economy. Land, Labour, and Capital passed under review; and solutions for some of the problems connected with Protection, Free Trade, the Functions of Government, &c., were proposed and discussed.

Mathematics and Book-keeping.

The work under this head presents several difficulties. We cannot devote much time to it; and most of our students have a very imperfect knowledge of the elementary principles of Mathematics when they come to us. Consequently, we have not as yet undertaken anything beyond Arithmetic, Mensuration, elementary Mechanics, and the less difficult operations in Leveliing and Surveying. Even in these few branches, we find it necessary to lay most stress on what is likely to have frequent application in the ordinary business of a farming community. The Book-Keeping also is of a special kind. It might be called farm Book-Keeping; farm, garden, field, and dairy accounts.

The work of last winter differed very little from that of the winter before; hence I shall not spend time in describing it, but simply refer to the examination papers on Arithmetic, Statics, and Book-keeping in Appendix 3, and the Class Lists in Appendix 4, for evidence of the work done in this department.

LAWN AND GARDEN.

When the College was first opened, I presume the country would not support the Government of the day in voting the money necessary to lay out and grade the grounds properly in front of the College buildings. At any rate the work was not done. Roads were made and trees planted, it is true; but the well defined ridges and furrows of the ploughed field remained. It was felt all along that something should be done to put the grounds in proper shape, before the trees would grow so large that they could not be transplanted. No action, however, was taken till last spring, when the officers representing the Fruit Growers of Ontario succeeded in getting authority to employ Mr. Miller, the well-known landscape gardener, of Fairmount Park, Philadelphia, to lay out the grounds, fix the sites for new buildings, and draw plans for new Green-houses and a Botanical Laboratory. The ground was measured and plans drawn during the summer. The work of transplanting, grading, and making new roads was begun by Mr. Miller's foreman in the month of September, and has already progressed so far as to convince even the most conservative that the improvement will be very great. For fuller information, see Report of Fruit Growers, in the Fourth Part of this volume.

The Fruit Growers' Association has also made large additions to our fruit and ornamental trees during the last two years; and J Playfair McMurrich, M.A., an accomplished graduate of Toronto University, has lately been appointed Professor of Biology and Horticulture. Consequently we have been able to give the students, not only exercise in practical gardening under Mr. Forsyth, as formerly, but also lectures on Horticulture by Professor McMurrich. So that the opportunities for theoretical and practical instruction in this department have been better during the past year than at any time previous.

In the early part of last winter, the second year students were sent to the gardener for instruction in grafting, budding, layering, etc.; about the middle of February, they commenced a special examination and study of our greenhouse plants; and at the end of March, most of them passed a creditable examination on the paper, headed Horticulture, in the first part of Appendix 3.

MECHANICAL DEPARTMENT.

A brief reference to this department is all that is necessary. The routine is unchanged, and the work varies but little from year to year. Our shop is a very homely one, with three or four benches and an outfit of such tools as are required for repairing

and general carpenter work. The students are sent to this department, as to all others, in rotation. They are first taught the use of the different tools, and afterwards employed in doing a variety of work, such as is constantly needed on the farm—making gates, waggon-tongues, whiffle-trees, etc.; and repairing fences, barns, and College buildings.

SPECIAL STUDENTS.

For the last four or five years we have had a Special Class for the convenience of farmers' sons, who have come to the College during the winter months and have returned home about the first of April, in time for the spring work on their own farms. Such students, by omitting the manual labour outside, have been able to take, in two terms, all the lectures that regular students have got in three terms. The following statement will explain what I mean :—

Regular Students.

Fall Term.—1st October to 22nd December, } Lectures half day and manual labour
Winter Term.—5th January to 31st March, } half day alternately.
Spring Term.—16th April to 30th June.
Summer Term.—1st July to 31st August—Manual labour on Experimental Farm.

Special Students.

Fall Term.—1st October to 31st December, } Lectures six hours a day.
Winter Term.—5th January to 31st March.
Spring Term.—16th April to 30th June, } Work at home on their own farms.
Summer Term.—1st July to 31st August.

Last year we had ten in this class—six first and four second year men. They attended lectures one-half of the day with the regular students of their own year; and the other half, when the regulars were employed outside, they (the specials) had lectures by themselves on the work of the Spring Term. Thus, by omitting the labour outside and giving the professors extra work inside, they were enabled, during the Fall and Winter Terms, to take not only the lectures of those terms, but also the lectures of the Spring Term as well.

I have only to add that this class has not been well patronized. Of the ten who entered it last October, only seven remained in it till the Easter Examinations. Hence the professors had to lecture to a very small number—so small that I have abolished the c ass altogether, and have organized in its stead a Special Class for the study of Live Stock and Veterinary Science.

EASTER EXAMINATIONS.

The Easter Examinations were, as usual, on the class-room work of the Winter Session (1st October to the 1st April). They commenced on the 18th, and ended on the 29th of March. The questions set in the different subjects will be found in the first part of Appendix 3. Most of them are difficult enough to differentiate the best students, while they give every honest worker a fair chance to pass. The answers were carefully valued, and the candidates arranged in three classes, according to the per centage of marks obtained by each.

All below 33 per cent					"plucked."
33 per cent.	to	49 per cent.,	inclusive		3rd class or passed.
50 "		74 "	"		2nd class honours.
75 "		100 "	"		1st class honours.

A complete record of all the candidates will be found in the Class-Lists (Appendix 4); not only those who passed or won honours, but also those who failed. A fair proportion got first-class honours in one or more subjects, and a few gained the high rank of first-class men in one or more of the five departments.

First-Class Men in the Departments at Easter.

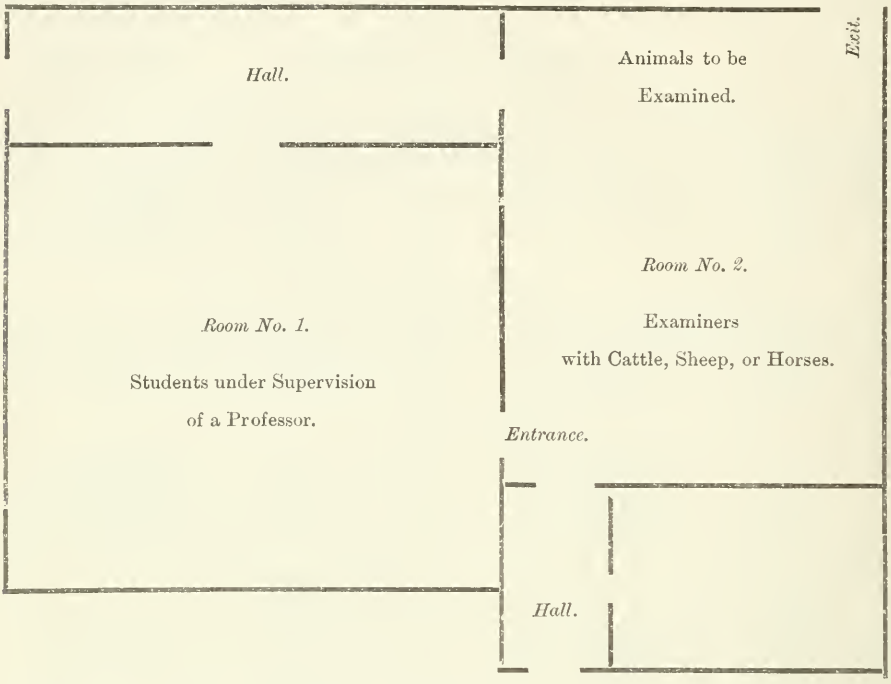
Departments.		FIRST YEAR.	Departments.		SECOND YEAR.
I.	Agriculture and Live Stock.	1. McKercher, W.	I.	Agriculture and Live Stock.	1. Howitt, W. 2. Wellington, F. 3. Shuttleworth, A.
II.	Natural Science.	1. Hutton, J. R. 2. Hopkins, J. A.	II.	Natural Science.	1. Howitt, W,
III.	Veterinary Science.	1. McKercher, W. 2. Thomas, F. J. 3. Hutton, J. R. 4. Raikes, H. 5. Ord, W. 6. Lough, W. H.	III.	Veterinary Science.	1. Howitt, W. 2. Wettlaufer, F. 3. Ramsay, R. A. 4. Shuttleworth, A. 5. Blanchard, M. G.
IV.	Eng. Lit. and Political Economy	1. Fotheringham, W. 2. Hutton, J. R.	IV.	Eng. Lit. and Political Economy	1. Howitt, W.
V.	Mathematics.	1. { McKercher, W. { Bowes, J. C. 3. Hutton, J. R. 4. { Hopkins, J. A. { Minard, W. F. 6. Clark, F. 7. { Willis, W. B. { McPherson, D. 9. Robertson, W. 10. Stevenson, C. R.	V.	Mathematics.	1. Howitt, W. 2. Wettlaufer, F.

Oral Examination on Live Stock.

In my last report I called your attention to the fact that we had instituted a practical examination of cattle, sheep, and horses, to be held twice a year—at Easter and Midsummer. We did so because we had discovered that it was quite possible for a young man to study books and copy notes of lectures, till he could write very sensible answers to questions on any class of animals, and, after all, be utterly unable to describe or judge intelligently any particular specimen, according to the standard which he found in his books or notes. The result has been all that we could have wished. The anticipation of these half-yearly examinations has led the students to go more frequently into the yards and stables, with note books in hand, to handle, judge, and compare various specimens of the several breeds of animals kept by the Institution.

In speaking more particularly of last Easter, I may say that the animals to be examined were taken into the Veterinary Class-room. The students were admitted, one at a time; and when each had spent the allotted number of minutes in examining the animals and answering questions, he passed out, and another from an adjoining class-room

took his place. The following diagram shows the relative position of the rooms used, and indicates more clearly than words how the examination was conducted :—



The class to be examined each day was sent early in the morning to room No. 1 in charge of a Professor ; and at the hour for commencing the examination, the first student on the list went from room No. 1 to room No. 2, to meet the examiners. When his time was up, he passed out of the building. Another from No. 1 took his place ; and so on, till the whole list was gone through.

PRIZE LIST.

Easter Examinations, March, 1882.

FIRST YEAR.

Agriculture and Live Stock—
1st. McKercher, W.

Natural Science—
1st. Hutton, J. R.
2nd. Hopkins, J. A.

Veterinary Science—
1st. McKercher, W.
2nd. Thomas, F. J.

English Literature & Composition—
1st. Fotheringham, W.
2nd. Hutton, J. R.

Mathematics—
1st. { McKercher, W.
{ Bowes, J. C.
2nd. Hutton, J. R.

General Proficiency—
1st. Hutton, J. R.
2nd. McKercher, W.
3rd. { Hopkins, J. A.
{ Thomas, F. J.

SECOND YEAR.

Agriculture and Live Stock—
1st. Howitt, W.
2nd. Wettlaufer, F.

Natural Science—
1st. Howitt, W.

Veterinary Science—
1st. Howitt, W.
2nd. Wettlaufer, F.

English Lit. and Pol. Economy—
1st. Howitt, W.

Mathematics—
1st. Howitt, W.
2nd. Wettlaufer, F.

General Proficiency—
1st. Howitt, W.
2nd. Wettlaufer, F.
3rd. Shuttleworth, A.
4th. Ramsay, R. A.

HONOR CERTIFICATES.

FIRST YEAR.

Agriculture and Live Stock—

1. McKercher, W.....Wroxeter (Huron), Ont.

Natural Science—

1. Hutton, J. R.....St. Catharines (Welland), Ont.
2. Hopkins, J. A.....Holt (York), Ont.

Vetrinary Science—

1. McKercher, W.....Wroxeter (Huron), Ont.
2. Thomas, F. J.....Oxford, England.
3. Hutton, J. R.....St. Catharines (Welland), Ont.
4. Raikes, H.....Barrie (Simcoe), Ont.
5. Ord, W.....Toronto.
6. Lough, W. H.....Clinton (Huron), Ont.

English Literature and Composition—

1. Fotheringham, W.....St. Marys (Perth), Ont.
2. Hutton, J. R.....St. Catharines (Welland), Ont.

Mathematics—

1. { McKercher, W.....Wroxeter (Huron), Ont.
   { Bowes, J. C.....Halifax, Nova Scotia, (equal).
3. Hutton, J. R.....St. Catharines (Welland), Ont.
4. { Hopkins, J. A.....Holt (York), Ont.
   { Minard, W. F.....St. Thomas (Elgin), Ont. (equal).
6. Clark, F.....Parkdale (York), Ont.
7. { Willis, W. B.....Whitby (Ontario), Ont.
   { McPherson, D.....Glanworth (Middlesex), Ont., (equal).
9. Robertson, W.....Wanstead (Lambton), Ont.
10. Stevenson, C. R.....Fingal (Elgin), Ont.

SECOND YEAR.

Agriculture and Live Stock—

1. Howitt, W.....Guelph (Wellington), Ont.
2. Wettlaufer, F.....Tavistock (Oxford), Ont.
3. Shuttleworth, A.....Mt. Albert (York), Ont.

Natural Science—

1. Howitt, W.....Guelph (Wellington), Ont.

Veterinary Science—

1. Howitt, W.....Guelph (Wellington), Ont.
2. Wettlaufer, F.....Tavistock (Oxford), Ont.
3. Ramsay, R. A.....Eden Mills (Halton), Ont.
4. Shuttleworth, A.....Mount Albert (York), Ont.
5. Blanchard, M. G .....Windsor, Nova Scotia.

English Literature and Political Economy—

1. Howitt, W.....Guelph (Wellington), Ont.

Mathematics—

1. Howitt, W.....Guelph (Wellington), Ont.
2. Wettlaufer, F.....Tavistock, (Oxford), Ont.

SPRING TERM.

(16th April, to 30th June.)

All specialists and generally some others leave at Easter ; hence we have been accustomed to hold two entrance examinations in the year, one on the 1st of October, and another on the 16th of April. The number admitted last April was 27. They were examined on the 17th and 18th ; and lectures commenced on the 19th.

As the Spring Term affords special opportunities for practice in the outside departments, the class-room work did not receive quite so much attention as during the Winter Term. Every one had to attend lectures three hours a day as usual ; but a little less time was occupied in study than during the winter months. From four and a half to five hours a day were devoted to practical work outside, a part of which was spent with the instructor, and the balance with the foremen of the several departments. By the instructor, I mean one of our men who spends most of his time in teaching the students how to perform such operations as they require to understand before taking charge of farms on their own responsibility ; such as harnessing and driving horses, ploughing, sowing, harrowing, rolling, mowing with scythe, driving a mower, and such like. The young men are sent to him in rotation, according to our knowledge of what they require ; and while under his instruction they get no wages. Hence they are generally anxious to learn as quickly as possible, so that they may be in a position to claim the promised pay for their work.

While particular prominence was given to practical work outside, the theoretical work inside was by no means neglected. In the department of Agriculture the cultivation of the various crops was taken up ; seeds were examined and judged ; the different modes of sowing discussed and exemplied ; the principles of underlying rotation, and the rotations suitable to different soils, climates, and circumstances were explained ; also the improvement of land by ordinary cultivation, subsoiling, fallowing, manuring, and laying down to grass. At the same time, under the head of Practical and Analytical Chemistry, the second year men were employed from three to four hours a week in the laboratory, examining and testing waters, soils, foods, manures, and samples of farm produce so far as our limited appliances would allow. In that way they were led to see the practical value of what they had already learned in Inorganic, Organic, and Agricultural Chemistry. They had opportunities for putting their knowledge to a practical test. Hence most of them entered cheerfully and heartily into the work. In Systematic and Economic Botany they received lectures on the general classification of plants, and studied more particularly those orders which contain the most important agricultural and economic plants—cereals, grasses, roots, and plants used in the manufacture of fabrics, oils, medicines, and other articles of commerce. At the same time the first year students were attending lectures on Geology and Botany. In the former they learned something of the formation, composition, and character of the soils found in the country ; in the latter, they studied the plant in relation to the soil and the atmosphere—its form, food, functions, and diseases, giving special attention to hybridization, the different modes of propagation,

and such diseases as smut, rust, mildew, etc. The lectures of the class-room were illustrated and applied to some extent by the gardener while the students were at work with him in the green-houses, gardens, and lawns. In the departments of Veterinary Science, English and Mathematics, the work was carried on as during the Winter Term. The first-year students had twenty-four lectures on the preparation, action and doses of about fifty kinds of medicine commonly used in veterinary practice; studied Sir Walter Scott's "Marmion"; wrote impromtu compositions; began the study of Mensuration; and continued that of Book-keeping from the previous term. During the same time, the second-year men had lectures on twenty-five or thirty additional medicines and the therapeutics of the veterinary art; read critically, and committed to memory Milton's "L'Allegro" and "Il Penseroso;" gave some attention to farm Book-keeping; and went twice a week into the fields with a master to apply what had previously been taught under the heads of Levelling, Surveying, and Drainage.

The term closed with a seven days' written examination on the class-room work, and a practical examination on various operations in the outside departments.

EXAMINERS AND EXAMINATIONS.

Hitherto we have found much difficulty in getting suitable persons to act as examiners in Agriculture and Live Stock. Many have the knowledge, but few the experience necessary for that kind of work; some have both the knowledge and the experience, but cannot spare the time. In order, therefore, to make our honours and dipolmas worth as much as possible to the recepients, I think it would be advisable, before long, to ask for a small annual vote, to pay examiners in all the departments; we should then find less difficulty in getting competent men to undertake the work; the students would not confine themselves so closely to the lecture-room notes—they would read more intensively; and, I have no doubt, it would have an excellent effect on both professors and students.

Last Easter, the examinations were all conducted by the professors of the College, except Practical Cattle, Practical Sheep, and English Literature; and at midsummer, the only subjects in which we had outside examiners, were English Literature and the Practical Handling and Judging of Horses. For cattle and sheep, we had the well-known prize-farm judges, John Hobson, Esq., of the County of Wellington, and Charles Drury, M.P.P., Crown Hill, Simcoe; for horses, we had the highest veterinary authority in the country, Dr. Smith, of the Veterinary College, Toronto; and in English literature, we secured the very efficient services of William Tytler, B.A., Guelph High School, and S. C. Smoke, B.A., of Paris, Ontario.

These gentlemen prepared questions and examined the answers at considerable sacrifice. Some of them, I know, did so under severe pressure of other duties. Hence it seems very inadequate remuneration, merely to thank them on my own behalf and in the name of the Institution which I have the honour to represent.

The results of the Midsummer Examinations are give fully in the second part of Appendix 4; from which it will be seen that a few in each year gained the rank of first-class men in one or more of the departments, and received honour certificates as follows:—

HONOUR CERTIFICATES.

Midsummer Examinations.

FIRST YEAR.

Agricultural—

1. Hutton, J. R.....St. Catharines (Welland), Ont.
   Jeffs, H. B.....Bond Head (Simcoe), Ont.
3. Creelman, J. A.....Collingwood (Grey), Ont.

Natural Science—

1. Hutton, J. R.....St. Catharines (Welland), Ont.
2. Slater, H.....Somerset, England.
3. Gregory, J.....Fredericton, New Brunswick.

Veterinary Materia Medica—

1.	Robertson, W.	Wanstead (Lambton), Ont.
	Jeffs, H. B.	Bond Head (Simcoe), Ont.
3.	McNish, C. H.	Lyn (Leeds), Ont.
	Saxon, E. A.	Cheshire, England.
4.	Slater, H.	Somerset, England.
	Neilson, J.	Lyn (Leeds), Ont.
7.	Maunsell, G. S.	Ottawa.
	Homfray, P.	Birmingham, England.
	Tucker,	Toronto.
9.	Hutton, J. R.	St. Catharines (Welland), Ont.
	Willis, W. B.	Whitby (Ontario), Ont.
12.	Smith, J. L.	Ottawa.
	Fotheringham	St. Mary's (Perth), Ont.
13.	McPherson, D.	Glanworth (Middlesex), Ont.

English Literature and Composition—

1. Hutton, J. R. ..... St. Catharines (Welland), Ont.
2. Slater, H. ..... Somerset, England.
3. Willis, W. B. ..... Whitby (Ontario), Ont.

Mathematics—

1. Slater, H. ..... Somerset, England.

SECOND YEAR.

Agriculture and Live Stock—

1. Shuttleworth, A. ..... Mount Albert (York), Ont.
2. Wettlaufer, F. ..... Tavistock (Oxford), Ont.
3. Ramsay, R. A. ..... Eden Mills (Halton), Ont.
4. Chase, O. ..... Cornwallis, Nova Scotia.

Natural Science—

1. Wettlaufer, F. ..... Tavistock (Oxford), Ont.

Veterinary Science—

1. Wettlaufer, F. ..... Tavistock (Oxford), Ont.
2. Ramsay, R. A. ..... Eden Mills (Halton), Ont.

English Literature—

1. Thomas, F. J. ..... Oxford, England.
2. Wettlaufer, F. ..... Tavistock (Oxford), Ont.

Mathematics and Book-Keeping—

1. Chase, O. ..... Cornwallis, Nova Scotia.
2. Shuttleworth, A. ..... Mount Albert (York), Ont.
3. Wettlaufer, F. ..... Tavistock (Oxford), Ont.

MEDALS.

Last year I had the pleasure of announcing for the first time, the fact, that you had decided to offer three medals for competition among the second year students of this Institution. The announcement was received with great applause, and all felt gratified that the Commissioner of Agriculture had taken another step in advance. A handsome design was prepared by Mr. G. E. Thomas, our late Bursar ; and the medals were struck in time for presentation on the 30th June.

The medals are designated—

THE GOLD MEDAL,
THE FIRST SILVER MEDAL,
THE SECOND SILVER MEDAL ;

and the terms of competition are as follows :—

All second year students are eligible to compete, provided they continue regularly from the beginning to the end of the course, without dropping out, or missing any of the prescribed examinations.

In case of failures in first year examinations, or the Christmas examinations of the second year, the President may grant supplemental examinations, or entertain claims for an *ægrotat*, without interfering with the right to compete.

The competition is :—

(1) By written examinations at Easter on the class-room work of the Fall and Winter Terms.

(2) By written examinations at the end of June on the class-room work of the Spring Term.

(3) By practical examinations at the above dates on cattle, sheep, pigs, horses, and the various operations taught or performed on the farm, in the garden, or in the carpenter shop.

The minimum standard for the gold medal is 50 per cent. of the marks in each subject, and an aggregate of 75 per cent. of the total number of marks in all the subjects ; for the silver medals, 50 per cent. in each subject and an aggregate of 67 per cent. in all the subjects.

The first competition for these medals was somewhat keen, as might be expected ; and there was one or two circumstances connected with it, which it is proper that I should mention for the purpose of doing justice to all concerned.

Mr. Wm. Howitt, of the County of Wellington, was a member of the class that graduated in 1881 ; but, on account of sickness at home, he had to drop out before the end of the year. When he returned to complete his course with the class of 1882, the question of his right to compete for a medal was at once raised. After reference to yourself, it was decided that Mr. Howitt might compete, provided he came back only for the time and lectures which he had lost the year before ; and on these conditions he entered the class of 1882. At the Easter examinations he headed the list in every department ; and it was generally admitted, that, although the other competitors were first-class men, there was nothing to prevent Mr. Howitt from taking the Gold Medal in June. Some, however, persisted in saying that the competition was unfair, that he had an advantage over the rest, that he should not be allowed to compete, &c., &c. Neither the Commissioner of Agriculture, nor the Faculty of the College admitted the correctness of these statements ; but rather than have any such feeling exist, Mr. Howitt voluntarily and magnanimously withdrew from the competition altogether.

The record of the other competitors was very creditable ; and the examiners felt, that in awarding medals to the first three on the list, they were in no way endangering the reputation of the College. The relative standing of the first four or five was as follows :—

(1) Written Examinations at Easter.	(2) Written Examinat'ns, Midsummer.	(3) Practical Examinations, Midsummer.
1. Howitt, W., County of Wellington.	1. Wettlaufer, F.	1. Wettlaufer, F.
2. Wettlaufer, F., County of Oxford.	2. Shuttleworth, A.	2. Shuttleworth, A.
3. Shuttleworth, A., County of York.	3. Ramsay, R. A.	3. Ramsay, R. A.
4. Ramsay, R. A., County of Halton.	4. Chase, O.	4. Chase, O.
5. Stover, J. W., County of Oxford.		

General Proficiency.

1. Wettlaufer, F., Tavistock (Oxford), Ont.—Gold Medallist
2. Shuttleworth, A., Mount Albert (York), Ont.—First Silver Medallist.
3. Ramsay, R. A., Eden Mills (Halton), Ont.—Second Silver Medallist.

Five medals have already been awarded, four of which have gone to Ontario, and one to Nova Scotia. The winners have all been non-drinkers and non-smokers, and all but one farmers' sons—

J. L. Webster, Nova Scotia.....1880.
R. J. Phin, County of Waterloo, Ont.....1881.
F. Wettlaufer, County of Oxford, Ont.....1882.
A. Shuttleworth, County of York, Ont..... "
R. A. Ramsay, County of Halton, Ont..... "

CLOSING EXERCISES.

Presentation of Medals and Prizes; Granting of Diplomas.

The closing exercises of the College took place on the 30th of June, which happened to be a very wet day. The rain poured down the greater part of the afternoon; but, notwithstanding, there was a very fair attendance of visitors from town and country to see the young men receive their diplomas, prizes, and honour certificates. In the absence of the Commissioner of Agriculture, the President of the College performed the ceremony of granting the diplomas; the members of the Faculty presented the prizes; and a number of visitors took part in distributing the honour certificates. The Gold Medal was presented by Professor George Buckland, of Toronto University; the First Silver Medal, by James Innes, M.P., of Guelph; and the Second Silver Medal, by James Laidlaw, M.P.P., of South Wellington.

Out of twenty-six candidates for diplomas, fourteen were successful. To this number were added three who had failed the year before, and two who should have received their diplomas in 1880, making in all a class of nineteen who were admitted to the status of "Associates of the Ontario Agricultural College."

Associates of the College.

1881.

Ballantyne, W. W.....Stratford, Ont.
Dickinson, C. S.....England.
Grindley, A. W.....Montreal.
Motherwell, W. R.....County of Lanark,
Phin, R. J.....Hespeler, County of Waterloo.
Phin, W. E..... " "
Pope, Herbert.....County of Grey, Ont.
Ross, James G.....Montreal.
Robins, W. P..... "

1882.

Blanchard, M. G.....Windsor, Nova Scotia.
Charlton, G. H.....St. George (Brant), Ont.
Chase, Oscar.....Cornwallis, Nova Scotia.
Dawson, J. J.....South Zorra (Oxford), Ont.
Dennis, James.....Weston (York), Ont.
Elworthy, R. H.....Jamaica.
Fotheringham, James.....St. Mary's (Perth), Ont.

Hallesy, Frederick	Merthyr Tydvil, Wales.
Horne, W. H	North Keppel (Grey), Ont.
Howitt, Wm	Guelph (Wellington), Ont.
Landsborough, John	Clinton (Huron), Ont.
Mahony, E. C	Hamilton (Wentworth), Ont.
Nicol, George	Cataraqui (Frontenac), Ont.
Ramsay, R. A	Eden Mills (Halton), Ont.
Shuttleworth, Arthur	Mt. Albert (York), Ont.
Silverthorne, Newman	Sommerville (Peel), Ont.
Stover, J. W	Norwich (Oxford), Ont.
Wettlaufer, Frederick	Tavistock (Oxford), Ont.
White, C. D	Hereford, England.

N.B.—In all the above lists, the county in which the student resides is given, even when the post-office address is in another county.

SPECIAL DIPLOMAS FOR STUDENTS WHO COMPLETED THE COURSE OF STUDY PRIOR TO FEBRUARY, 1880.

In the circular issued by the ex-President Mr. Johnston in 1877 and thereafter, it was stated that diplomas would be given to all students who should complete the course of study and pass satisfactorily all the prescribed examinations. But the college was not chartered till 1880; and therefore it was impossible for the President to fulfil the promises made in 1877, '78 and '79. In the fall of 1879, a change in the presidency took place; and the new President did not feel justified in taking any action in the matter, without special instructions from the Government. At length, however, the case was laid before the Honourable the Commissioner of Agriculture; and, after due consideration, he decided that diplomas should be granted to all ex-students whom the ex-President, Wm. Johnston, Esq., M.A., would recommend as having completed the work and fulfilled all the conditions laid down in the College Circular during the time of his incumbency. The following is Mr. Johnston's report, made on the 12th day of August, 1882, and approved by the Commissioner of Agriculture on the 31st of the same month:—

Ontario Agricultural College.

Guelph, *12th August, 1882.*

To the Hon. S. C. Wood,

Commissioner of Agriculture:

The Ontario Agricultural College and Experimental Farm was incorporated by Chap. 33 of 43 Vic., Ont. Previous to that the institution had no legal status, and no power to grant diplomas. A number of students had, however, completed satisfactorily the prescribed course of study during the four preceding years; and some of them have applied for diplomas. Upon due and careful consideration, it has been decided to grant the prayer of their petition, as I have been informed, and allow the Act of 1880, above referred to, to have a retrospective effect, so far as granting of diplomas is concerned.

As the institution, up to the period of incorporation, was under the charge of the undersigned, he has the honour, at the command of the Honourable the Commissioner of Agriculture, to report as follows, as to the students who, during the years referred to, had satisfactorily completed the prescribed course of study, and would, therefore, under the Act of Incorporation, be now eligible for diplomas:—

I.—Sessions of 1875–76–77.

The institution opened on the 1st day of May, A.D. 1874, but, owing to various causes, no curriculum was issued until the 1st day of January, 1875. The complete course of study prescribed by that curriculum was, during the years of 1875, 1876 and 1877,

completed satisfactorily by the following students, whom the undersigned has, therefore, the honour of recommending for diplomas :—

1. Andrew Charles O'Beirne.
2. John Andrew Campbell.
3. John Duncan Douglas.
4. Stevenson Dunlop.
5. Allan John Lindsay.
6. Thomas Henry Mason.
7. George William Meyer.
8. George Herbert Shaw.
9. William John Sykes.
10. Clarence Wells.

II.—Session of 1877–78.

The students who, at the close of this session, had satisfactorily completed the prescribed course of study, and under the existing Act, rendered themselves thereby eligible for the diplomas, for which the undersigned has now the honour of recommending them, are as follows :—

1. Edward Crompton.
2. Charles I. Davis.
3. William K. Farlinger.
4. David Graham.
5. Thomas Logan.
6. David Morrison Naismith.
7. William Stewart.
8. John B. Warren.

III.—Session of 1878–79.

The additions made to the college buildings during the summer of 1877, enabled the number of students to be greatly increased. Those who entered on the 1st day of October, 1877, were at the end of this session at the close of their two years of study. Of this number those who in August, 1878, had, by passing through this course satisfactorily, rendered themselves eligible to receive the diplomas, for which the undersigned has now the honour to recommend them, were as follows :—

1. Ernest Louis Bonnard.
2. James Clark.
3. Nelson James Clinton.
4. Alexander Fyfe.
5. George H. Gillespie.
6. George H. Greig.
7. William Jopling.
8. Arthur Nichol.
9. John R. Randall.
10. Charles B. Robinson.
11. John Robertson.
12. Lewis Toole.
13. Angus W. Warnica.
14. George P. White.
15. Peter J. Wilkinson.
16. John Willis.

IV.—Session of 1879–80.

The undersigned had closed his connection with the Institution before the end of this session, but all the students of this class had been entered by him, and had pursued their studies, during most of the time, under his charge. So far, therefore, as he is concerned, he has the honour to recommend that diplomas be granted in the class of this session, to the following :—

1. John Anderson.
2. George Edward Ash.
3. Donald Peter L. Campbell.
4. Richard K. Chapman.
5. Alexander Hume Clutton.
6. Mark. A. Dawes.
7. Richard F. Holterman.
8. Joseph Wellesley Lomas.
9. Herbert Macaulay.
10. John Lindsay Webster.

Since the first day of January, 1875, there have been a few alterations in, and additions to, the curriculum, but the students above mentioned, have completed the course of study as it was respectively arranged at the date of their entrance and graduation.

Though, prior to incorporation, there were no oral or written examinations on the work and study required to be undergone during the course of apprenticeship, that course

was passed through, and completed in a highly satisfactory manner, by each and all of the students whose names are recorded above.

The undersigned has, therefore, the honour of recommending that, upon due application to James Mills, Esq., M.A., the present President of the institution, diplomas be duly issued to the several ex-students of the Ontario Agricultural College, whose names are given in the preceding pages of this report.

All of which is respectfully submitted.

Wm. Johnston,
Ex-President of the Ontario Agricultural College.

VISITORS.

I believe I am correct in saying that the Ontario Agricultural College and Experimental Farm has a larger number of visitors, from home and abroad, than any other institution in the country—visitors of every class and calling, but especially farmers. The only agricultural college in the Province; the only institution in the British Dominions that has systematically attempted to combine study and manual labour; an institution that has been keenly criticised and soundly abused—all this has given us more or less notoriety, and has excited a curiosity to see and know exactly what we are doing.

Last year we had not only the usual number of daily visitors, but several large excursions of farmers in the month of June, from Niagara, Wentworth, Huron, Bruce, Grey, Simcoe, York, and Peel, with smaller companies from Wellington, Waterloo, and other places. Everything passed off pleasantly. Short addresses were delivered by leading excursionists, and resolutions passed at the close of each day's proceedings.

SUMMER TERM.

(1st July to 31st August.)

At the close of the spring term (30th June), when the year's lectures were ended, most of the farmers' sons went home for haying and harvest, and some of the other students hired out with farmers for the summer months; so that only forty-one remained with us during the Summer Term (July and August). These worked nine and a half hours a day, giving more or less attention to all the departments, but spending the greater part of their time where it was most needed, *i.e.*, on the farm. I shall not weary you with a detailed account of the routine in each department, but simply say that the young men received more or less instruction in the fields, the yards, the gardens, and the shop. They spent a portion of their time in a special class for the purpose, learning how to dig, plough, harrow, sow, shear sheep, mow, cradle, drive a reaper, bind, shock, and such like; and did all there was to do in the summer months, on a four hundred acre grain and stock farm, and in the management of a large vegetable garden, flower garden, orchard, and lawn.

Harvest Home.

The term closed on the 26th August, with the annual athletic sports, and the harvest home procession. For several weeks previous, the young men occupied their evenings on the college campus in walking, running, jumping, putting the stone, and similiar exercises. The attendance of visitors at the games was large. The weather was favourable, and everything passed off pleasantly. After the games came the harvest home procession around the college grounds, and the presentation of the prizes by Mrs. Brown and James Innes, M.P. So ended the scholastic year 1881–'82.

FALL TERM.

Commencement of a new Scholastic Year.—1st October to 22nd December, 1882.

In October, 1881, I accepted more applications than I had room for; and they all came. The consequence was, the College was over-crowded, and some had to board out for a while. In October, 1882, I refused all after the exact number (130) had been accepted; and, strange to say, no less than eighteen of those for whom I kept rooms, failed to put in an appearance. The result is that only 112, instead of 130, have been in attendance for the last three months.

Sixty-two old students returned, and fifty new ones were admitted at the commencement of the term—twenty-two by passing an examination, and twenty-eight on presentation of certificates. Their names and post-office address will be found in the second part of Appendix 1; and the following lists show the counties, countries, and religious denominations which they represent:—

Counties, &c.	*Students.*	*Counties, &c.*	*Students.*
Brant	2	Ontario	1
Bruce	1	Ottawa	10
Cyprus	1	Oxford	1
Elgin	4	Ohio	1
England	16	Peel	1
Glengarry	3	Peterborough	2
Grey	2	Perth	6
Hamilton	1	Prince Edward	1
Huron	1	Prince Edward Island	1
Ireland	3	Quebec	2
Kent	1	Simcoe	8
Kingston	1	Scotland	3
Lambton	3	Toronto	6
Leeds	3	Turkey	1
Manitoba	1	Wales	1
Middlesex	1	Welland	1
Montreal	1	Wellington	2
New Brunswick	6	Wentworth	2
Nova Scotia	1	West Indies	1
Northumberland	1	York	1

Total number in attendance during Fall Term 112
Number of Ontario counties represented 24

Religious Denominations.

Episcopalians	47
Presbyterians	27
Methodist Church of Canada	16
Roman Catholics	6
Baptists	4
Methodist Episcopals	3
Primitive Methodists	2
Congregational	2
Plymouth Brethren	1
Lutherans	1
Unitarians	1
Universalists	1
Swedenborgians	1
Total	112

Age of Students.

The standard age for admission was recently changed from fifteen to sixteen years. The ages of those now in attendance range from fifteen to thirty, averaging $18\frac{1}{3}$, as indicated by the following table:—

18	at the	age of	16	years.
27	"	"	17	"
28	"	"	18	"
15	"	"	19	"
13	"	"	20	"
4	"	"	21	"
4	"	"	22	"
1	"	"	24	"
1	"	"	26	"
1	"	"	30	"

Average age, $18\frac{1}{3}$ years.

The time tables in Appendix 2 indicate the subjects which are taken up in the Fall Term, and the number of hours allotted to each. Lectures commenced on Wednesday, the 4th of October, and continued without interruption till the 19th December.

The first-year students received three lectures a week on the characteristic points and peculiarities of the different breeds of cattle; had a full course of lectures with experiments on Chemical Physics and Inorganic Chemistry; devoted an hour and a half to Human Physiology; and spent some time in studying the Anatomy and Physiology of the Horse. Under the head of English and Mathematics, they read a portion of Scott's "Marmion," wrote compositions once a week, and reviewed certain portions of Arithmetic, with special reference to the requirements of farming in Canada.

The attention of the second-year men was directed to such subjects as stock-breeding, farm management, and the experimental plots—the selection of animals for beef; the housing, feeding, and fattening of the same; the comparative values of pasture and green fodder; results from the different kinds of seed, soil, and manures; and the previous season's experiments with wheat, oats, and grasses. They had one lecture a week on Meterorology, and a full course of Agricultural Chemistry—the composition of different plants in relation to the soils on which they grow; the preservation and renovation of soils, the chemical composition and value of different manures, the superphosphates, double silicates, and other substances which furnish plant food. They spent two hours a week at lectures on Veterinary Pathology, and one in handling and examining horses for spavin, ring-bone, splint, founder, and other diseases—all under the eye and direction of our veterinary surgeon, Dr. Grenside; they also read Shakespeare's "Julius Cæsar," and devoted some time to the study of applied Statics, Levelling, and Drainage.

Terminal Examinations, December, 1882.

The examinations commenced on the 19th and ended on the 21st December. The questions were not particularly difficult, as they were intended only to indicate who were making a right use of their time, and to prepare the candidates for a severer test at Easter. The results having been published in the daily papers, it is unnecessary to repeat them here. I may, however, give a fuller outline of the work covered by the examinations:—

OUTLINE OF CLASS-ROOM WORK.

Fall Term.

First Year.

Department 1.—Agriculture.

Breeding, rearing, and feeding of animals. Points to be considered in deciding what kind of animals to keep.

Horses.—Different breeds of horses, and leading characteristics of each; type of horse required for farm work; breeding, feeding, and general management.

Cattle.—History and characteristics of Shorthorns, Herefords, Polland Angus, Ayrshires, Jerseys, Devons, Galloways, etc.; grade cattle; milch cows—points of a good milch cow; breeding generally, cross-breeding, in-and-in breeding; pedigree.

Sheep.—Breeds of sheep generally considered; long-woolled sheep; medium-woolled sheep; short-woolled sheep; crosses between different breeds compared; texture, quality, quantity, and uses of different kinds of wool.

Swine.—Characteristics of various breeds; management of sows; stores; bacon-curing, etc.

Department 2.—Natural Science.

Chemical Physics.—Matter, accessory and essential properties of matter; attraction, various kinds of attraction—cohesion, adhesion, capillary, electrical and chemical; specific gravity; weights and measures; heat, measurement of heat, thermometers, pyrometers, specific and latent heat; sources, nature and laws of light; spectrum analysis.

Inorganic Chemistry.—Scope of subjects; elementary and compound substances; chemical affinity; symbols; nomenclature; combining proportions by weight and by volume; atomic theory; atomicity of the most important elements; oxygen and hydrogen; water—its nature, functions, decomposition, and impurities; nitrogen; the atmosphere—its composition, uses and impurities; ammonia—its sources and uses; nitric acid and its connection with plants; carbon; combustion; carbonic acid and its relation to the animal and the vegetable kingdom; sulphur and its compounds; manufacture and uses of sulphuric acid; phosphorus; phosphoric acid and its importance in agriculture; chlorine—its bleaching properties; bromine; iodine; silicon, etc.

Human Physiology.—Evidences of life; elementary tissues, connective tissues, adipose tissue, cartilage, bone; alimentary system, teeth, salivary glands, stomach (structure and functions of), intestines, liver and pancreas; foods, digestion of an ordinary meal, dieting; respiratory system; ventilation; excretory system; functions and structure of the kindneys and skin; clothing; bathing; nervous system, general working of the system, structure and working of the brain, eye, ear and other sense organs; locomotory system, structure and physiology of the muscles; walking; running; exercise; hygiene—draining, thirty-seven motive diseases, contamination of water, etc.

Department 3.—Veterinary Science.

Anatomy and Physiology of the horse, ox, sheep and pig; osseous system, muscular system, syndesmology, plantar system, and odontology.

Department 4.—English.

Composition.—Impromptu exercises once a week.

English Classics.—Critical study of Scott's "Marmion."

Department 5.—Mathematics.

Arithmetic.—Review of subject, with special reference to farm accounts; tables of weights and measures discussed; interest, discount, stocks and partnership.

Mental Arithmetic.—Calculations in simple rules, fractions and compound rules.

Second Year.

DEPARTMENT 1.—AGRICULTURE.

Experimental Plots.—The results of last season's experiments with wheat, oats, barley, peas, grasses, clovers, roots, etc.; liability to disease; effects of various manures on different crops; growth of plants, etc.

Farm Management.—Detailed account of the treatment of each field, results from different kinds of seed and soil; effects of manure; harvesting, storing, and threshing of crops; fall ploughing; subsoiling, etc.

Stock-feeding.—Value of feeding materials; estimate for winter keep of live stock; housing, feeding, and fattening; points to be observed in selecting animals for fattening; feeding experiments; common diseases of animals; management of animals on pasture; value of green fodder. Dairy management and cheese-making.

DEPARTMENT 2.—NATURAL SCIENCE.

Meteorology.—Relation of meteorology to agriculture; composition and movements of the atmosphere; nature and manipulation of the barometer, its importance in forecasting the weather; temperature, description of the various instruments used in its measurement and how to use them; solar and terrestrial radiation; the influence of forests on climate; mists, fogs, clouds, rain, hail, and snow; description of instruments used in measuring rain and snow fall; velocity and direction of wind; causes affecting climate; influence of climate on vegetation.

Agricultural Chemistry.—Connection between chemistry and agriculture; the various compounds which enter into the composition of the bodies of animals; the chemical changes which food undergoes during digestion; chemical changes which occur during the decomposition of the bodies of animals at death; the functions of animals and plants contrasted; food of plants and whence derived; origin and nature of soils; classification of soils; causes of unproductiveness in soil and how detected; composition of different plants in relation to the soils upon which they grow; rotation of crops; preservation, development and renovation of soils; manures classified; the chemical action of manures on different soils; chemical theories in reference to the action of superphosphates; the action of lime in the decomposition of double silicates; feeding of animals; classification of foods; chemical results in the use of different foods; points necessary to be considered in order to obtain the full value of artificial and natural foods.

DEPARTMENT 3.—VETERINARY SCIENCE.

Veterinary Pathology.—Osseous System—nature, causes, symptoms, and treatment of diseases of bone, as splint, spavin, ringbone, etc.

Muscular System—nature, causes, and treatment of flesh wounds, etc.

Syndesmology—nature, causes, symptoms, and treatment of bog spavin, curb, and other diseases of the joints.

Plantar System—nature, causes, symptoms, and treatment of corns, sand-crack, founder, and other diseases of the foot.

Odontology—diseases of the teeth and treatment of the same.

DEPARTMENT 4.—ENGLISH LITERATURE.

English Classics.—Critical study of Shakespeare's "Julius Cæsar."

English Composition.—Rules for capitals and punctuation; essay writing.

Department 5.—Mathematics.

Mental Arithmetic.—Calculations in reduction, fractions, and analysis.

Statics.—Forces; the mechanical powers; friction; the steam-engine; strength of materials; units of work, etc.

Levelling and Draining.—General principles; discharging water ways; how, where and when to commence draining; depth of drains and distance apart; furrow drains; draining followed by other improvements; draining implements, etc.

II.—THE BOARDING HOUSE AND COLLEGE BUILDINGS.

For the information of those who have not seen the College buildings, I shall quote a paragraph from my last report, and refer to the description given by the Government Architect in the 6th Appendix to this report:—

College Building.

The College building, as shown on frontispiece, is a plain substantial structure, without much claim to architectural beauty. Like the Institution itself, it was built little by little without any very definite idea of the shape it might ultimately assume. When the Government first bought land and determined to establish an Agricultural College, the Architect drew plans for a building which would have suited the purpose exactly, but the cost seemed too great and the country was not prepared for it, consequently it was decided eight years ago to commence work with a few students in Mr. Stone's farmhouse. Additions and alterations were made from time to time as the number of students increased, till the result is, the building which you see outlined and described by the Government Architect in Appendix 6—altogether different from what was originally intended; and though it is not what we would like, it nevertheless affords considerable accommodation, and serves the purpose very well.

In the building, as it now stands, there are one hundred and twenty-two rooms—three class-rooms, a reading-room, a library, a room to be fitted up for a museum, a laboratory, two offices, a public reception-room, sixty-two students' dormitories, a large dining-hall, a servants' dining-room, a store-room, pantry, kitchen, scullery, laundry, drying-room, eight bath-rooms, nine bed-rooms for servants, the messenger's room, a parlour and bed-room for the Matron, a sitting-room and bed-room for the Assistant Resident Master, nine rooms in the left wing occupied as a dwelling house by the Professor of Agriculture, six rooms in the centre occupied by the President and his family, three wash-rooms, an engine room and a coal-house. The size, position, and use of each room, can be better understood from an examination of the plans above referred to than from a verbal description. Hence I shall not attempt anything more elaborate under this head.

Cottages.

Four of the cottages asked for in my last report, have already been erected—two on the lawn and two in adjoining fields. A description of each by the Architect, will be found in Appendix 6. The general appearance and dimensions can be seen by referring to the plans and engravings on the following page.

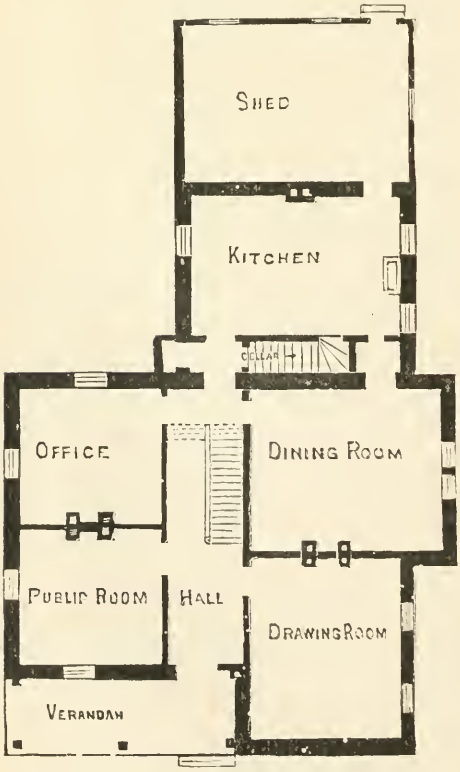
Boarding House.

In the Boarding House nothing special has occurred during the past year. Things have moved along as usual. Our supplies are provided by contract; and, generally speaking, the quality of the articles furnished has been satisfactory. The Matron has superin-

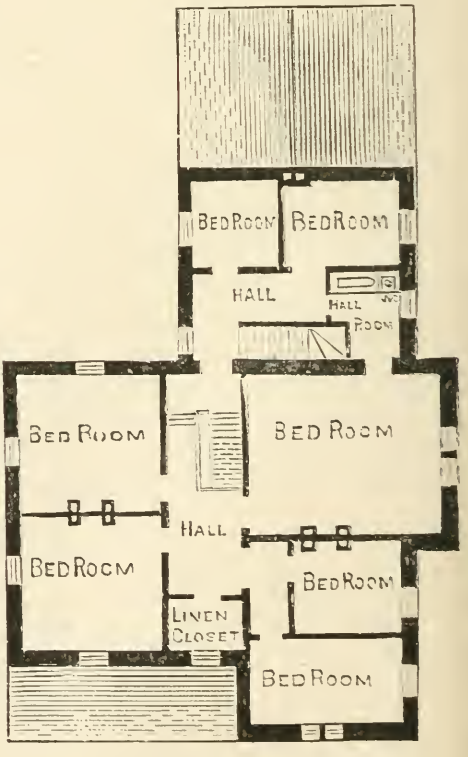
AGRICULTURAL COLLEGE, GUELPH

RESIDENCE FOR PROFESSOR.

PERSPECTIVE VIEW.



GROUND FLOOR PLAN.

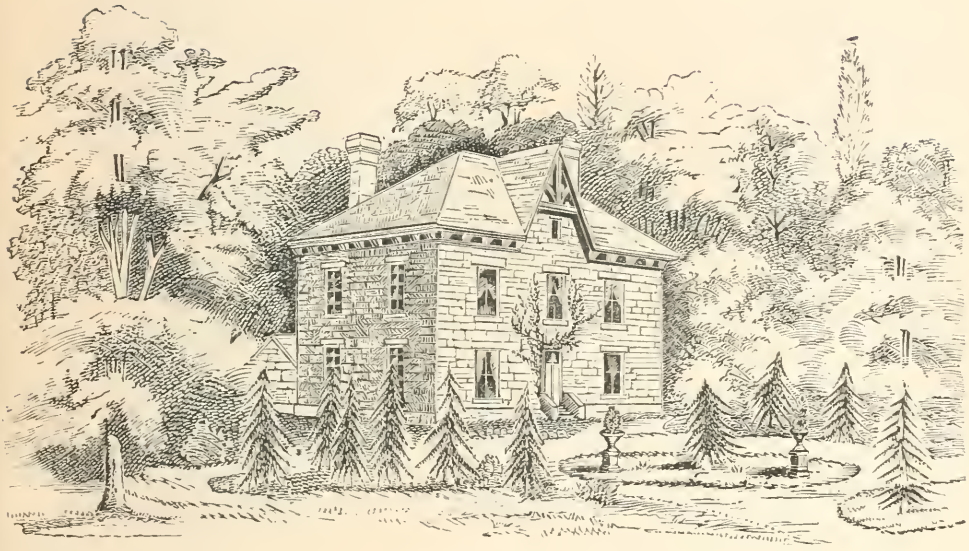


FIRST FLOOR PLAN.

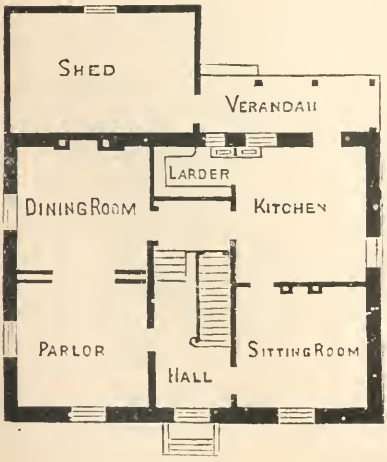
SCALE—20 feet to an inch.

AGRICULTURAL COLLEGE, GUELPH.

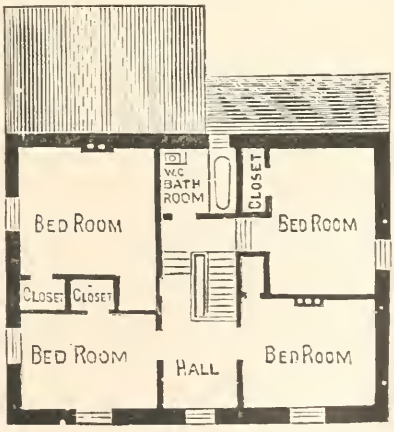
RESIDENCE FOR BURSAR.



PERSPECTIVE VIEW.



GROUND FLOOR PLAN.

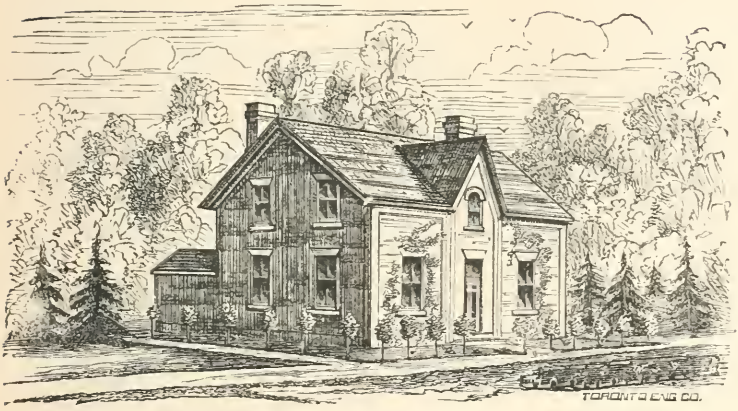


FIRST FLOOR PLAN.

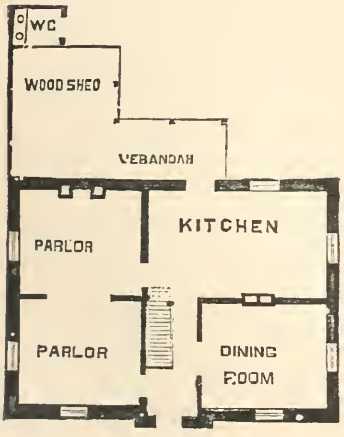
SCALE—20 feet to an inch.

AGRICULTURAL COLLEGE, GUELPH.

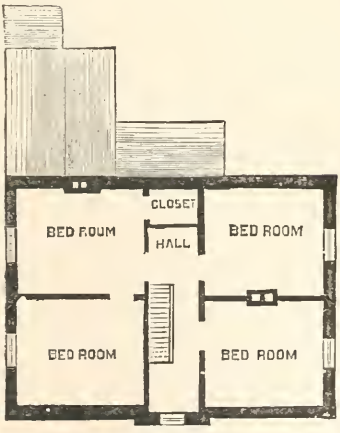
COTTAGE FOR FARMER.



PERSPECTIVE VIEW.



GROUND FLOOR PLAN.



FIRST FLOOR PLAN.

SCALE—20 feet to 1 inch.

tended the work in the culinary department, and the Assistant Resident Master has taken charge of the students at meals and assisted me in looking after them in the halls and dormitories.

Daily Routine.

In regard to the surroundings of our students in the College, and the duties required of them, I may say that their bed-rooms are furnished with beds, bedding, bureaus, mirrors, wash-stands, study-tables, and chairs. They sleep separately, two in a room, and in a few instances three. The daily routine during the Fall, Winter, and Spring Terms, is as follows:—

All are required to rise at six to make their beds and put their rooms in order. At half-past six they go to breakfast; and at seven the students of one division are sent to work outside, and those of the other employ their time as they feel disposed, till eight o'clock. From eight to nine the latter are at drill or gymnastics, and from nine to twelve at lectures in the class-room. Both divisions return to the boarding house, and prepare for dinner at half-past twelve. The bell rings at half-past one, and the division that was in at lectures in the forenoon, goes out to work in the afternoon. The other division is free till two o'clock. From two to five it attends lectures; and at five both divisions return again to the bording house to prepare for tea at half-past five. From tea time to seven o'clock, and in spring to eight o'clock, they generally rest or take exercise. From seven to nine in fall and winter, and from eight to half-past nine in spring, they study in their rooms under the supervision of a master. At nine or half-past nine, according to the season of the year, they proceed to roll-call and evening prayers; all lights are put out at ten, and doors closed at half-past ten. Every student who is not under ban for some misdemeanour, is allowed out one evening in the week, till half-past ten. To some parents, perhaps, this will appear late; but, as it takes not less than thirty minutes to come from the city to the College, any earlier hour would scarcely give sufficient time. When going out, each student leaves his name with the master in charge, and is required to report himself on his return, that we may know whether all are in or not before the doors are closed for the night.

Such is the routine in the boarding house, and such are the duties required of the students therein, during nine months of the year. As the months of July and August are devoted entirely to work in the outside departments, the duties inside differ but little from those of an ordinary boarding house on a large scale.

Discipline.

Where you have one hundred and twenty or thirty young men full of animal spirits boarding and lodging in the same building, it is by no means easy to maintain proper discipline. It is indeed a very difficult task, and one which imposes on those who are responsible, a load of care and anxiety from which there is no escape night or day. It requires kindness, firmness, tact, constant vigilance, and sometimes stern severity.

The conduct of our students is, generally speaking, good. Some, of course, do not work so well as they should, and a few are both idle and troublesome; but the great majority are quiet, industrious, and well-behaved young men. Whenever I find one persistently idle and mischievous, or vicious, I send him home, because my experience is that such boys almost invariably get worse instead of better, where they have so many companions.

During the past year I found it necessary to suspend five from the boarding house—three weeks each, for card-playing, in violation of the rules; to send three home for total failure in examinations; to dismiss two for persistent idleness and frequent violation of rules; and to expel one for card-playing on Sunday and insolent disobedience to an officer of the Institution.

III.—THE BUSINESS DEPARTMENT.

Under this head there is a variety of work for which the President and the Bursar are chiefly responsible—correspondence, books and accounts, general business, and the finances.

Correspondence.

Most of the correspondence falls to the lot of the President, and consists chiefly in sending out circulars, distributing reports, and answering inquiries about terms of admission, course of study, duties of students, cost of board and tuition, books used, books recommended, etc. Last year I distributed 1,700 copies of our last Annual Report, sent out about 900 circulars, and wrote, on an average, from five to six letters a day. Reports were sent to Agricultural Colleges in Britain and the United States, to most of the granges in Ontario, and to all private persons who sent for copies.

Books and Accounts.

The Bursar, as financial agent of the Institution, is responsible for the work under this head. It is his duty to examine all accounts against the College and the Farm, to check them by invoices and requisitions, to charge each item under the proper heading, and make out separate statements for the College and the Farm once a month, submitting the former to the President and the latter to the Farm Superintendent for approval, and then to forward both to the Treasury for payment. He receives and accounts for all moneys from the College, the Farm, and the Treasury Department, and pays all accounts that have been approved by the President or the Farm Superintendent, and passed by the Auditor. He also keeps three sets of books :—

No. 1, showing the monthly expenditure under each head of the appropriation for the College and boarding house.

No. 2, giving in detail the revenue and expenditure of the outside departments under the Farm Superintendent.

No. 3, showing the account of each student from the day he enters the College till he leaves it—tuition fees, board and washing, amounts allowed for labour, and cash balances paid the College for board and washing.

Printed sheets containing the names of all the students are furnished each foreman daily, who fills in the blanks with the description of the work done that day by the students in his department, the number of hours each has worked, and the estimated value of such work. These are filed daily in the office, and journalized weekly. At the end of the financial month these sums are posted to the credit side of each student's account in the ledger, whilst on the debit side is placed the cost of the board and washing for that month, as obtained from the books of the store-room and the laundry. Two hundred and six such accounts were made out last year.

General Business.

In addition to his duties as book-keeper, the Bursar has to provide supplies for the boarding house and take charge of the store-room. He is required to examine and weigh the meat and groceries as they are delivered, and see that the quality of all articles furnished by tender is up to the standard required by the terms of contract.

The President signs requisitions for all purchases, takes charge of the College buildings generally, and is responsible, not only for the management, but for the discipline of the inside departments, as regards both officers and students.

Finances.

The financial tables in Appendix 5 contain a brief statement of the College and Boarding-house accounts for the year 1882, and the estimated expenditure for 1883. Table No. 1 shows the expenditure under the various heads; No. 2, the revenue from all sources; No. 3, the College account with the Farm and the Garden, for the past year; and No. 4, the estimated expenditure for 1883.

The total expenditure in 1882, on the regular account, was $31,374.79, and for an extra year's fuel, $2,512.13. When I came to the Institution the vote for fuel was a year behind, and remained so till last year. The money voted in 1881 was to pay for fuel purchased in 1880, and that voted in 1882 was for fuel purchased in 1881. Consequently I had to buy on seven or eight months' credit, till June last, when you decided to advance $2,512.13, rather than allow the irregularity to continue. The revenue and expenditure for the year may be formally stated as follows:—

Total expenditure on regular account		$31,374 79
Sum voted by Legislature	$22,424 25	
Revenue from fees and board	8,637 16	
		$31,061 41
Over expended on regular account		$313 38
Extra year's fuel paid by Treasury Department		2,512 13
		$2,825 51
Analysis of Revenue:		
Tuition Fees		$3,670 00
Balances on Board Accounts		4,936 16
Supplemental Examinations		31 00
Total College Revenue in 1882		$8,637 16

This amount, subtracted from the gross expenditure, shows the net expenditure of the College for the last twelve months—

Gross Expenditure in 1882	$31,374 79
Revenue in 1882	8,637 16
Net Expenditure in 1882	$22,737 63

The amount deducted from students' board accounts for work done in the outside departments last year, was $4,421.68. If this were added to the revenue given above, the net expenditure for the year would be reduced to $18,315.95, thus:

Gross Expenditure, 1882		$31,374 79
Revenue in 1882	$8,637 16	
Allowed to students for labour in outside departments	4,421 68	
		13,058 84
Balance		$18,315 95

In the right hand column of Table 4 will be found the estimated expenditure for the year 1883. Salaries and wages remain almost the same as they were, except a money allowance to the Professors of Chemistry and Biology for their board and lodging, which were furnished by the College last year; so that the only items which need any explanation are *meat* and *fuel*—an increase of $300 for the former, and $200 for the latter, both of which are made necessary by the very marked increase in the price of these articles, especially in all kinds of meat.

MISCELLANEOUS ITEMS.

Library.

A very important factor, in the education given here, is our Library of about 4,000 volumes, selected and added to from time to time, with reference to the present work and future wants of our students. We have not only a good representation of the best books which treat of the several branches taught in the Institution, but also a large number of volumes on history, biography, travels, poetry, and general literature, as well as the latest and best dictionaries and encyclopædias. The Professor of Chemistry acts as Librarian, and under his direction a student gives out and exchanges books, for an hour every day at noon. A catalogue of the books will be found in Part VII. at the end of this Report.

Reading Room.

In our Reading Room, which may be described as large, commodious, and well-lighted, we have thirty-nine papers and magazines on file—four sent free, thirty furnished by the College, and five by the Literary Society.

Papers and Magazines.

(a) Sent Free by the Publishers.

Journal of Commerce, Montreal.
Journal of Agriculture, Montreal.
Canadian Entomologist, London.
Monthly Weather Review, Toronto.

(b) Furnished by the College.

Daily Globe.
Daily Mail.
Weekly Globe.
Weekly Mail.
Guelph Mercury.
Guelph Herald.
Canadian Farmer and Grange Record.
Farmer's Advocate.
Rural Canadian.
Grip.
Canadian Lumberman.
North British Agriculturist.
Irish Farmer's Gazette.
Mark Lane Express.
National Live-Stock Journal.
Scientific American.
Scientific American Supplement.
Boston Journal of Chemistry.
American Agriculturist.
Cultivator and Country Gentleman.
City and Country.
Country Gentleman's Magazine.
Gardener's Monthly.
Veterinarian.
Veterinary Journal.
Aberdeen Free Press.
St. John Telegraph.
Good Words.
Sunday Magazine.
Quiver.

(c) Furnished by the Literary Society.

London Graphic.
Punch.
Century Magazine.
Nineteeth Century.
Fortnightly Review.

Museum.

We have also a room set apart for a museum in the south end of the College buildings, not so large as we could wish, but fairly well adapted to the purpose. If the roof were raised, a gallery constructed, additional windows put in the east end, and the whole room re-floored and re-fitted, we could soon make a very interesting and useful display of grain, seeds, and specimens in Natural History, Entomology, Geology, Meteorology, etc.

Under several of these heads we have already a very fair collection, most of which has recently been classified and arranged by the Professor of Biology, who acts as curator of the museum. For a classified list of the specimens now on hand, please turn to the appendix to Professor McMurrich's report in the third part of this volume.

Literary Society.

The Literary Society in connection with the College, was never more active, vigorous, and useful than at the present time. The members of this society meet every Friday evening in one of the class-rooms, to practice reading, debating, and declamation. The discussions are often quite spirited; and the work done is, undoubtedly, a very valuable addition to the educational appliances of the Institution. In the performance of such work, the young men have an opportunity of testing their ability before they assume the responsibilites of life on a broader scale. They learn to speak in public, and gradually become acquainted with the rules of order according to which public meetings are conducted. Their wits are sharpened, their reasoning powers developed, and their manners improved. Last year the funds of the society were spent in the purchase of papers, magazines, reviews, and prizes for reading, essay-writing and public speaking.

Changes in Staff.

Since the publication of our last report, there has been only one change in the teaching staff of the Institution. Our Professor of Chemistry, J. Hoyes Panton, M.A., resigned his position in February last, and was succeeded by R. B. Hare, B.A., Ph.Dr. (Breslau). Without a labaratory, with very scanty equipment, and in spite of many discouragements, Professor Panton laboured hard for four years to build up and develop the department which he so ably represented. He was a lover of science, an indefatigable worker, a very successful teacher; and, while I am strongly opposed to the tendency to lavish praise indiscriminately upon those who are going to some other part of this world, or have left it altogether, I feel that it is cold modesty to say that in the matter of promptness and system in work, fidelity to duty, loyalty to superiors in office, and willingness to oblige, Professor Panton has few, if any, equals. It was, therefore, no small loss to the Institution and to me personally, when Mr. Panton gave up his professorship here for a more lucrative position in Winnipeg. I am pleased, however, to be able to say that his successor, Dr. Hare, is a man of undoubted scientific attainments—a doctor of science *magna cum laude*, an enthusiastic worker, and a successful lecturer.

Wants and Recommendations.

Our wants are numerous, as usual; but I shall confine my remarks to a few of the most urgent:—

1. A washing machine worked by steam in the laundry.
2. Three or four medium sized steam kettles and a new range in the kitchen.
3. Lowering of steam boilers now used for heating College buildings.
4. Alterations in museum—raising roof, constructing stairway and gallery, re-flooring, re-fitting, and furnishing.
5. Removal of barns, stables and sheds; and use of materials in construction of new farm buildings on site indicated on plan of grounds, in order to make room for Chemical Labaratory and new Green and Propagating Houses, with a class-room and Botanical Laboratory attached.

It is unnecessary for me to dwell on each of these items separately, but simply to say that we cannot get on much longer without a new range in the kitchen; that the lowering of the boilers is an absolute necessity; that it is useless for us to do much in the museum till the alterations in the room are completed; and that the most pressing wants of the Institution in the all important department of Natural Science, cannot be provided for till the farm buildings now in use are removed to a new site. In view of these facts, it is to be hoped that the Department of Public Works may consider it right and expedient to provide for the above items in the Estimates of 1883.

There is one other matter to which I would refer briefly, *i. e.*, the appointment of a

Steward. In my opinion, the time has come when such an appointment is not only proper, but in the strictest sense of the word necessary. In order to attend properly to the financial business of the College and the Farm, the Bursar should be in his office at the College from nine in the morning till five in the evening. At the same time, he should go frequently to the market to buy supplies for the boarding house, and should check the quantity and examine the quality of all articles delivered at the store-room for use in the College; but, as a matter of fact, he cannot be in two places at the same time. Hence the need of dividing up the work in this department. You know how difficult it is to get a young, unmarried man, who is qualified to lecture, and, at the same time, control so large a number of young fellows in the dining-room, dormitories and elsewhere. When we do get such a man, he remains with us only till he can prepare himself for something better. Consequently we are never done searching for one that combines the necessary qualifications for the position of Assistant Resident Master. Hitherto I have myself occupied a few rooms in the centre of the main building, and my presence there has relieved my assistant of much responsibility and many difficulties; but when I move into the apartments now occupied by Professor Brown's family, it will be very different. In fact, it will be impossible for one assistant to control three stories of dormitories in the front building and two stories in the rear building, unless I remain in one of the buildings, not only all day, but also till eleven o'clock at night, five days out of the week—till it is certain that every one is in bed and all lights out. I think, therefore, that I am justified in recommending that a married man be appointed as Steward, to take charge of the store-room and dining-room, look after the halls and dormitories, give instruction in drill and gymnastics, and assist generally in the discipline and management of the boarding house. If such an appointment were made, I could get an assistant for less money than is now paid, and the amount expended for drill and gymnastics could be applied in part payment of the Steward's salary.

STUDY OF AGRICULTURE.

Course of Reading for Farmers' Sons.

After speaking at some length of the work which our College is doing, it may not be amiss to refer briefly to the provision which is now made in part, and should be more fully made, for the study of Agriculture in the primary and intermediate schools of this Province. No one will deny that the first and most important function of all our Public Schools, is to teach well the elements of an English education—Reading, Writing, Spelling, Arithmetic, English Grammar, Composition, and the outlines of Geography; but, if in addition to these, or in connection with them, anything else can be taught in the rural schools, there is no doubt that Agriculture, underlying, as it does, the prosperity of every class in the community, should receive attention before Algebra, Euclid, or anything else that has yet found a place on the programme of studies. If by any means we could furnish the rising generation of farmers in this Province with such information as would enable them to raise two cattle or sheep where one is now raised, to make two pounds of butter or cheese where one is now made, to grow two bushels of apples where one is now grown, or to draw from the soil and atmosphere six or eight bushels per acre of grain more than their fathers are now getting, the effect on every profession, trade and department of business would be marvellous—the country would be surprised at its own prosperity; and this being so, it is manifest that the State should not only make ample provision for giving instruction in Agriculture, but should, by all legitimate means, seek to encourage young men to study the subject.

For the last three or four years, a number of the most intelligent and progressive farmers and a few others have been discussing this question. The amount of time spent in studying some subjects that are of very little practical value, has been complained of; and the necessity for a change has been urged with more or less persistency, till, at length, the Minister of Education has been induced to give Agriculture a place on the programme of work prescribed for both the Public and the High Schools of this Province. This is undoubtedly a step in the right direction, and one that will receive the approval of all classes of the population; but it does not go far enough. Something more must be done,

before we can look for much practical benefit from the change. In the Public Schools, at least—the only schools that the great majority of the people can attend—we maintain that so important a subject as Agriculture should not be left in the optional list of studies. It should be placed in the fixed list, and provision at once made in the Normal Schools at Toronto and Ottawa, for giving all teachers in training a full course of lectures on the subject.

In the meantime, however, something might be done to encourage teachers to qualify themselves for the changed condition of things, and to induce farmers' sons, whether at school or not, to spend a portion of their time during the winter evenings, in acquiring such information regarding their own occupation, as would enable them to adopt more enlightened and profitable methods of farming than those which prevail in many parts of the Province at the present time. A course of study could be prescribed, examinations held, and certificates granted annually—all with scarcely any change in the present educational machinery, and a very small addition to the present outlay for printing and examiners. Examination papers on Agriculture could be prepared and sent out with the Intermediate examination papers to all the High Schools, and the answers returned either to the Minister of Education, or to the Secretary of the Agricultural and Arts Association, so that the only expense would be for the payment of examiners, under the supervision of the Minister of Education, or the Council of the Agricultural and Arts Association. At first, no doubt, the number of candidates would be very small; but it would soon increase, and I have no doubt that in a few years the results would be most gratifying to all concerned. Already the Council of the Agricultural and Arts Association has asked for $500 for this purpose; and with the same object in view, I beg to submit the following suggestions as to certificates, course of reading, and books of reference:—

Second and Third Class Certificates.

For the Third Class Examination, the questions should be prepared with the view of ascertaining the candidate's knowledge of the first principles of Agriculture—such as could be learned from a general course of reading on the subject, or from elementary lectures, without special study of the natural sciences.

For the Second Class Examination, a broader and more exact knowledge of the subject would be required, and the questions should be of such a character as to test the general attainments of the candidate, and, at the same time, enable him to give proof of excellence in those branches of the subject to which he may have devoted special attention.

Course of Reading for Third Class Certificates.

1. Different kinds of soils; their properties; variations in their composition, texture, and condition; essential differences between good and poor soils. Substances found in plants; and sources whence they are obtained. Exhaustion of land; causes; how prevented; best modes of restoring exhausted lands. Necessity for manure; production and waste of farm yard manure; use and manufacture of artificial manures; lime, salt, gypsum, bone dust, and mineral superphosphates as manures.

2. *Tillage Operations.*—Ploughing, harrowing, rolling, etc.; respective advantages and disadvantages of deep and shallow, fall and spring ploughing; sub-soiling; fallowing; drainage, where necessary and how done; effects of thorough tillage on lands; times and methods of sowing; after cultivation; harvesting.

3. The crops which each kind of soil is best adapted to produce; succession or rotation of crops; importance and necessity of rotation; rotations suitable to different soils and climates in Ontario; good courses of cropping; bad courses of cropping.

4. *Live Stock;* best kinds of stock for various farms and localities; summer and winter management; economy of good management; general rules for guidance in breeding; conditions and circumstances favourable to cattle farming, sheep farming, dairy farming, and mixed husbandry.

5. *Food;* chemical elements and compounds found in the most important kinds of feed and fodder which can be successfully grown in Ontario; different materials necessary for growth, maintenance of heat, and laying on flesh; feeding and fattening of animals.

Course of Reading for Second-Class Certificates.

1. *The Plant.*—Relations of the mineral, vegetable, and animal kingdoms to each other; nature and sources of plant food; composition of the most important crops grown in Ontario; period of highest nutritive value; chemical changes in the ripening of fruit, grain, and fodder crops; influence of climate on perfection of growth.

2. *The Soil.*—Physical and chemical properties of soils; classification of soils as determined by these properties; comparative fertility of different varieties of soil; active and dormant ingredients of soils; best means of converting dormant into active.

Chemical and physical conditions affecting the barrenness and fertility of soils; causes of unproductiveness; power of different soils to hold manures; influence of frost, aspect, elevation, and climate on the productiveness of soils.

3. *Manures.*—Production, management and application of farm-yard manure; conditions which influence its quality; comparative values of cattle, sheep, and horse manures; green crop manuring; composts.

Properties and uses of artificial manures: lime, plaster, salt, bone-dust and mineral superphosphates as manures; circumstances under which each should and should not be used; times and modes of application; how to avoid the waste of such manures in the soil; their action on seeds and young plants; favourable and unfavourable action at different stages in the growth of crops; action of nitrates and ammoniacal manures on cereals, roots and grasses; special action of salt when used alone, and also in connection with other manures.

Night soil and animal manures; combinations of manures for certain purposes; manures which impoverish the soil; quantities of manures to be used on various soils with different crops; general principles regulating the selection of manures.

4. *Tillage Operations.*—Deep and shallow ploughing, fall and spring ploughing, subsoiling, rolling, fallowing, &c.; advantages and disadvantages of each; preparation of land for different crops, as fall wheat, spring wheat, barley, oats, peas, and maize; differences in cultivation of light and heavy soils.

5. *Seed and Sowing.*—Quality of seed; importance of using clean and pure seed; effect of age on the character of crop, its rapidity of growth, and liability to disease; quantity of seed per acre; methods and depth of sowing; change of seed, why necessary.

6. *Roots.*—Cultivation of roots and tubers—turnips, mangolds, carrots, beets, and potatoes.

7. *Green Fodders.*—Oats and peas, tares, lucerne, sainfoin, prickly confrey, clovers, etc.; their comparative values; the management most appropriate for each; management of pastures.

8. *Rotation of Crops.*—Crops which each kind of soil is adapted to produce; succession or rotation of crops; importance and necessity of rotation; principles underlying it; rotations suitable to different soils, climates, and systems of farming in Ontario; their effects on the land.

9. *Drainage.*—Principles of drainage; effects on soil and sub-soil; laying out and construction of drains.

10. *Exhausted Lands.*—Causes of exhaustion; how avoided; best means of restoring and enriching impoverished land.

11. *Breeding of Animals.*—Principles for guidance in stock-breeding; reproductive powers—how strengthened or weakened; pedigree influence—how intensified or reduced; loss of size in pedigree stock; how to control good or bad qualities; maintenance of constitutional vigor; common causes of barrenness in male and in female; special aptitudes of certain breeds for different conditions of soil and climate; principles which regulate special peculiarities, such as early maturity, rapid production of flesh, production of milk, growth of wool, etc.

Horses.—Most valuable breeds of horses for this Province; the leading characteristics of each; type of horse required for farm work; breeding, feeding, and general management; common diseases and their treatment.

Cattle.—Characteristic points—merits and demerits of Shorthorns, Herefords, Polled Angus, Ayrshires, Jerseys, Devons, Galloways and Holsteins; in and in breeding;

breeding in the line; results of each system; grade cattle; milch cows—points of a good milk cow; general management; economy of good management; conditions affecting quantity and quality of milk. Common diseases and remedies.

Sheep.—Characteristics of different breeds; long-wooled, medium-wooled, and short-wooled sheep; crosses between different breeds compared; influence of breed, climate, food, soil, and shelter on the quantity and quality of wool—evenness, lustre, yolk, fineness of fibre, felting power, etc.; feeding; winter and summer management; management of ewes before, during, and after lambing season; rearing of lambs.

Swine.—Characteristics of the most important breeds of pigs; management of sows and stores; bacon curing, etc.

12. *Food and Feeding.*—Composition and properties of the most important varieties of feed and fodder available to the Ontario farmer; classification of foods; chemical results in the use of different foods; "heat-producing" and "flesh-forming" ingredients in food; best methods of combining these in feeding, so as to secure desired results; points to be observed in order to obtain the full value of natural and artificial foods; increase of value by preparation of food; shelter and warmth as means of economising food; chemical changes produced in malting of barley; its action and value as a feeding material; "good and bad systems of feeding."

13. *Diseases of Crops.*—When plants are most liable to disease; causes of disease; chlorosis; fungoid diseases, as bunt, smut, rust and mildew; remedies.

14. *Orchards.*—Planting, cultivation, pruning, grafting, etc.; best varieties of fruit-trees for different soils and climates of Ontario; diseases, and insect pests.

15. *Forestry.*—Planting and cultivation of forest trees, shade and ornamental trees, etc.

16. *Entomology.*—Common insects injurious to vegetation; their habits and the best means of checking and preventing their ravages.

Books of Reference.

Hand Book of Agriculture, embracing soils, manures, rotation of crops and live stock (Wrightson); *First Principles of Agriculture* (Lawson and Tanner); Report of the Ontario Agricultural Commission; *The Canadian Farmer's Manual of Agriculture*, (Whitcombe); *New American Farm Book*, (Allen); *Farming for Profit*, (Read); *Talks on Manures*, (Harris).

Elements of Agricultural Chemistry and Geology, (Johnston & Cameron); *The Chemistry of Common Life*, (Johnston by Church); *How Crops Feed*, (Johnson); *How Crops Grow*, (Johnston).

Stock Breeding, (Miles); *The Complete Grazier*, (Youatt & Burn); *The Live Stock of the Farm*, (Pringle); *Illustrated Stock Doctor and Live Stock Encyclopædia*, (Manning); *Manual of Cattle Feeding*, (Armsby); *The Shepherd's Own Book*, (Youatt, Skinner & Randall); *American Shepherd*, (Morrell); *The Horse in the Stable and the Field*, (Stonehenge); *Harris on the Pig.*

Annual reports of the Entomological Society of Ontario; *Harris's Insects Injurious to Vegetation.*

Regarding these books it is scarcely necessary to state that they are only a few out of a large number that might be named: and I do not presume to say that a much better selection could not be made. All I wish is to indicate in outline what might be done to promote the study of Agriculture throughout the Province.

I have the honour to be, Sir,

Your obedient Servant,

James Mills,

President.

APPENDIX 1.

1. COLLEGE ROLL FOR THE YEAR 1882.

2. COLLEGE ROLL FOR THE SESSION 1882–'83 (1st Oct. to 31st March).

1. COLLEGE ROLL FOR THE YEAR 1882.

Names.	P. O. Address.	County, Etc.
Anderson, H. F.	London	Middlesex.
Austin, W. C.	Ottawa	Carleton.
Aylsworth, H.	Deseronto	Prince Edward.
Ardagh, A. E.	Barrie	Simcoe.
Barclay, E. H.	St. Andrew's	Scotland.
Bethune, K.	Ottawa	Carleton.
Bignell, E.	Claude	Peel.
Blanchard, M. G.	Windsor	Nova Scotia.
Begg, R. A.	Orillia	Simcoe.
Broughton, C. J.	Hamilton	Wentworth.
Brown, W.	Guelph	Wellington.
Bowes, J. B.	Pinkerton	Bruce.
Bowes, J. C.	Halifax	Nova Scotia.
Bowman, B.	Westmontrose	Waterloo.
Black, C. H.	Amherst	Nova Scotia.
Black, P. C.	Windsor	Nova Scotia.
Boyd, J. L.	Toronto	York.
Ballantyne, A. W.	Stratford	Perth.
Buckingham, F.	Stratford	Perth.
Boyle, R. H., (Viscount)	Castle Martyr	Ireland.
Boyle, Hon. H. G.	Castle Martyr	Ireland.
Braun, P. E.	Ottawa	Carleton.
Chase, O.	Cornwallis	Nova Scotia.
Cunningham, C. C.	Ottawa	Carleton.
Cutting, A. N.	Lynn	England.
Clarke, F.	Parkdale	York.
Clark, C.	Parkdale	York.
Carnegie, J.	Peterboro'	Peterboro'.
Creelman, J. A.	Collingwood	Grey.
Cowley, E. A.	Windsor	England.
Cameron, H. H.	Ottawa	Carleton.
Carpenter, C.	Simcoe	Norfolk.
Carpenter, P. A.	Collingwood	Simcoe.
Courbarron, F. H.	St. Andrew's	Scotland.
Cream, W. C.	Paisley	Bruce.
Cross, E.	Montreal	Montreal.
DeVeber, W. H.	St. John	New Brunswick.
Donaldson, J.	Wolfville	Nova Scotia.
Dickinson, G. A.	Zion	Durham.
Davis, R. A.	Cayuga	Haldimand.
Dawson, J.	South Zorra	Oxford.
Dewar, J. D.	Tiverton	Bruce.
Dennis, J.	Weston	York.
Duthie, J.	Guelph	Wellington.
Day, F.	Kingston	Frontenac.
DeWinton, W. F.	Ottawa	Carleton.
Denne, T. H.	Peterboro'	Peterboro'.

1. COLLEGE ROLL FOR THE YEAR 1882.—*Continued.*

Names.	P. O. Address.	County, Etc.
Domville, H. T.	Hamilton	Wentworth.
DeChadenèdes, F. B.	London	England.
Elworthy, R. H.	Norwich	Oxford.
Eddington, D. C.	Glencreggan	Scotland.
Edmundson, J. A.	Orillia	Simcoe.
Eidet, W.	Philipsburg West	Waterloo.
Edgar, A. E.	Toronto	York.
Erskine, H. R.	Ottawa	Carleton.
Ferguson, G. A.	Kingston	Frontenac.
Ffolkes, R. W.	Hillington Lynn	England.
Fraser, T. A.	Kinburn	Carleton.
Frith, H. M.	St. John	New Brunswick.
Fotheringham, W.	St. Mary's	Perth.
Fuller, S. G.	Stratford	Perth.
Finlayson, H.	Trinidad	West Indies.
Gilpin, W.	Ottawa	Carleton.
Gilpin, R. R.	Halifax	Nova Scotia.
Gibson, R.	Glen Allen	Wellington.
Goold, G. E.	Kingston	Frontenac.
Garland, C. S.	Montreal	Montreal.
Gillespie, J. W.	Innerkip	Oxford.
Gregory, J.	Fredericton	New Brunswick.
Greenlaw, F. W.	Plymouth	England.
Grindley, A.	Montreal	Montreal.
Halleay, F.	Merthyr Tydvil	Wales.
Howitt, W.	Guelph	Wellington.
Havard, B. T.	Merthyr Tydvil	Wales.
Holden, W. L.	Hamilton	Wentworth.
Hutton, J. R.	St. Catharines	Lincoln.
Hutton, W. E.	St. Catherines	Lincoln.
Holcroft, H. S.	Orillia	Simcoe.
Holpkins, J. A.	Holt	York.
Hanson, E. T.	Constantinople	Turkey.
Harrison, F. W.	Owen Sound	Grey.
Hubbard, W. W.	Burton	New Brunswick.
Homfray, P.	Hales Owen	England.
Hannah, J.	Egmondville	Huron.
Ings, F. W.	Charlottetown	Prince Edward Island.
Jones, W. S.	Halifax	Nova Scotia.
Jeffs, H. B.	Bond Head	Simcoe.
Joseph, S. S.	Quebec	Quebec.
Jones' Williams, A. H.	Swansea	Wales.
Jordan, A. W.	Simonds	New Brunswick.
Kestell, R. H.	Simcoe	Norfolk.
King, J. E.	Middlemarch	Elgin.
Kelly, S. A.	Fairview	Wentworth.
Keil, C. A.	Chatham	Kent.
Lindsay, W.	Woodstock	Oxford.
Lindsay, S. G.	Woodstock	Oxford.
Law, F. G.	Stratford	Perth.
Luton, E. E.	New Sarum	Elgin.
Lough, W. H.	Clinton	Huron.
Latimer, R. Mc.	Marshville	Welland.
Lehmann, A.	Orillia	Simcoe.
Little, W.	Killyleagh	Simcoe.
Mahony, E. C.	Hamilton	Wentworth.
Major, C. H.	Croydon	England.
Maunsell, G. S.	Ottawa	Carleton.
Messecar, C. L.	Scotland	Brant.
McDonald, J.	Petrolia	Lambton.
McLennan, A.	Ottawa	Carleton.
McLennan, D.	Camerontown	Glengarry.
McLennan, J. D.	Lancaster	Glengarry.

1. COLLEGE ROLL FOR THE YEAR 1882.—*Continued.*

Names.	P. O. Address.	County, Etc.
Maughan, W. E.	Owen Sound	Grey.
Monteith, W.	Exeter	Huron.
Morton, F. G.	Barrie	Simcoe.
McKim, J.	Parker	Wellington.
McKercher, W.	Wroxeter	Huron.
McNish, C. N.	Lyn	Leeds.
McPherson, D.	Glanworth	Middlesex.
Magor, J. F.	Montreal	Montreal.
Minard, W.	St. Thomas	Elgin.
McMartin, A. M.	Martintown	Glengarry.
McLeod, M. D.	Oak Ridges	York.
McPhail, E.	Toronto	York.
Miller, J. P.	Norwich	England.
McIntosh, G. H.	Mossboro'	Wellington,
Mathewson, G.	Montreal	Montreal.
McLean, J. R.	Innerkip	Oxford.
Merritt, C. L.	Scotland	Brant.
Mohr, A.	Cincinnati	Ohio.
Malcolmson, K G.	East Barnet	England.
McDonald, W. A.	Stratford	Perth.
Moyle, F. T.	Davis	Brant.
McGregor, J.	Coiborne	Northumberland.
Neilson, J.	Lyn	Leeds.
Nicol, G.	Cataraqui	Frontenac.
Newport, E. T.	St. George	Bermuda.
Ord, W.	Toronto	York.
Philbin, T. R.	Ottawa	Carleton.
Pope, E.	Sarawak	Grey.
Patterson, W.	Merritton	Lincoln.
Perry, D. E.	Winnipeg	Manitoba.
Pope, A. H.	London	England.
Pope, H.	Sarawak	Grey.
Paton, G. C.	Langside	Scotland.
Pinhey, H. R.	Ottawa	Carleton.
Powys, P. C.	Fredericton	New Brunswick.
Pearce, J. W.	Alymer	Elgin.
Pocock, H. R.	Brockville	Leeds.
Poe, J. J.	Callan	Ireland.
Raynes, G. S.	Côte St. Antoine	Montreal.
Raikes, H.	Barrie	Simcoe.
Ryall, F.	Paris	Brant.
Rennie, E. A.	Hamilton	Wentworth.
Robinson, J. D.	Middlemarch	Elgin.
Rose, G. M.	Toronto	York.
Robertson, W.	Hanstead	Lambton.
Routh, R. O.	Montreal	Montreal.
Ramsay, R. A.	Eden Mills	Wellington.
Rogers, F.	Deans	Haldimand.
Rhodes, O.	Chatham	Kent.
Riddell, A. A.	Kinburn	Carleton.
Redmond, W. J.	Peterboro'	Peterboro'.
Ruel, F. C.	Southsea	England.
Sharman, H. B.	Stratford	Perth.
Shearer, E.	Ottawa	Carleton.
Shuttleworth, A.	Mount Albert	York.
Silverthorne, N.	Somerville	Peel.
Stover, J. W.	Norwich	Oxford.
Smith, J. A.	Martintown	Glengarry.
Smith, J. L.	Ottawa	Carleton.
Smith, F. W.	Scotland	Brant.
Schwartz, J. A.	Quebec	Quebec.
Skinner, A. F.	Woodstock	Oxford.
Strange, A. W.	Kingston	Frontenac.

1. COLLEGE ROLL FOR THE YEAR 1882.—*Continued.*

Names.	P. O. Address.	County, Etc.
Stevenson, C. R.	Fingal	Elgin.
Saxton, E. A.	Nantwich	England.
Sinclair, A. L.	Montreal	Montreal.
Slater, H.	Taunton	England.
Steers, O.	Ottawa	Carleton.
Soden, F. H.	London	England.
Spohn, H. B.	Ancaster	Wentworth.
Shaw, E. E.	Wolverhampton	England.
Shaw, A. G.	Wolverhampton	England.
Tronson, H.	Oakville	Halton.
Tourangeau, A.	Quebec	Quebec.
Towsend, K. S.	Aldershot	Wentworth.
Thomas, F. J.	Oxford	England.
Torrance, W. J.	Ottawa	Carleton.
Terhune, F.	Brantford	Brant.
Tucker, H. V.	Toronto	York.
Urmston, R. B.	Southsea	England.
White, W. G.	Lanark	Lanark.
White, C. D.	Lanark	Lanark.
Wyndham, W. T.	Roach's Point	York.
Williams, A. W.	Culloden	Oxford.
Wettlaufer, F.	Tavistock	Perth.
Warren, F. F.	Limmosol	Cyprus.
Westlake, G.	Yarmouth Centre	Elgin.
Wilmot, E. M.	London	England.
Weston, G. H.	Ottawa	Carleton.
Whitehead, J.	Brampton	Peel.
Whithead, R.	Broadstairs	England.
Wark, A. E.	Wanstead	Lambton.
Wroughton, T.	Montreal	Montreal.
Willis, W. B.	Whitby	Ontario.
Weatherston, N. C.	Toronto	York.
Weatherston, D.	Toronto	York.
Total		206

2. COLLEGE ROLL FOR THE SESSION 1881-'82 (1st Oct. to 31st March).

Names.	P. O. Address.	County, Etc.
Austin, W. E.	Ottawa	Carleton.
Ardagh, A. E.	Barrie	Simcoe.
Aylsworth, H.	Deseronto	Prince Edward.
Bowes, J. C.	Halifax	Nova Scotia.
Black, C. H.	Amherst	Nova Scotia.
Black, P. C.	Windsor	Nova Scotia.
Boyd, J. L.	Toronto	York.
Boyle, R. H. (Viscount)	Castle Martyr	Ireland.
Boyle, Hon. H. G.	Castle Martyr	Ireland.
Ballantyne, A. W.	Stratford	Perth.
Bockingham, F.	Stratford	Perth.
Braun, P. E.	Ottawa	Carleton.
Clark, F.	Parkdale	York.
Clark, C.	Parkdale	York.
Creelman, J. A.	Collingwood	Grey.
Cowley, E. A.	Windsor	England.

2. COLLEGE ROLL FOR THE SESSION 1881-'82.—*Continued.*

Names.	P. O. Address.	County, Etc.
Carpenter, P. A.	Collingwood	Simcoe.
Courbarron, F. H.	St. Andrew's	Scotland.
Cream, W. C.	Paisley	Bruce.
DeVeber, W. H.	St. John	New Brunswick.
DeWinton, W. F.	Ottawa	Carleton.
Denne, T. H.	Peterboro'	Peterboro'.
DeChadenèdes, F. B.	London	England.
Edmundson, J. A.	Orillia	Simcoe.
Erskine, H. R.	Ottawa	Carleton.
Eddington, D. C.	Glencreggan	Scotland.
Fotheringham, W.	St. Mary's	Perth.
Fuller, S. G.	Stratford	Perth.
Frith, H. M.	St. John	New Brunswick.
Finlayson, H.	Trinidad	West Indies.
Garland, C. S.	Montreal	Montreal.
Gregory, J.	Fredericton	New Brunswick.
Hanson, E. T.	Constantinople	Turkey.
Harrison, F. W.	Owen Sound	Grey.
Hubbard, W. W.	Burton	New Brunswick.
Hannah, J.	Egmondville	Huron.
Holcroft, H. S.	Orillia	Simcoe.
Ings, F. W.	Charlottetown	Prince Edward Island.
Jeffs, H. B.	Bond Head	Simcoe.
Jones' Williams, A.	Swansea	S. Wales.
Jordon, A. W.	Simonds	New Brunswick.
Kelly, S. A.	Fairview	Wentworth.
Keil, C. A.	Chatham	Kent.
Latimer, R. Mc.	Marshville	Welland.
Lehmann, A.	Orillia	Simcoe.
Little, W.	Killyleagh	Simcoe.
Luton, E. E.	New Sarum	Elgin.
Major, C. H.	Croydon	England.
Maunsell, G. S.	Ottawa	Carleton.
Miller, J. P.	Norwich	England.
McLennan, A.	Ottawa	Carleton.
McLennan, D.	Camerontown	Glengarry.
McLennan, J. D.	Lancaster	Glengarry.
McIntosh	Mossboro'	Wellington.
McNish, C. N.	Lyn	Leeds.
McKinn, J.	Parker	Wellington.
McLean, J. R.	Innerkip	Oxford.
Merritt, C. L.	Scotland	Brant.
Mathewson, G.	Montreal	Montreal.
Malcolmson, K. G.	East Barnet	England.
McDonald, W. A.	Stratford	Perth.
McDonald, J.	Petrolia	Lambton.
McPherson, D.	Glanworth	Middlesex.
Morton, F. G.	Barrie	Simcoe.
Mohr, A.	Cincinnati	Ohio.
Moyle, F. T.	Paris	Brant.
McGregor, J.	Colborne	Northumberland.
Neilson, J.	Lyn	Leeds.
Ord, W.	Toronto	York.
Perry, D. E.	Winnipeg	Manitoba.
Paton, G. C.	Langside	Scotland.
Powys, P. C.	Fredericton	New Brunswick.
Pearce, J. W.	Alymer	Elgin.
Pocock, H. R.	Brockville	Leeds.
Poe, J. J.	Callan	Ireland.
Robertson, W.	Hanstead	Lambton.
Rennie, E. A.	Hamilton	Wentworth.
Robinson, J. D.	Middlemarch	Elgin.
Rose, G. M.	Toronto	York.

2. COLLEGE ROLL FOR THE SESSION 1881-'82.—*Continued.*

Name.	P. O. Address.	County, Etc.
Raynes, G. S.	Montreal	Montreal.
Redmond, W. J.	Peterboro'	Peterboro'.
Ruel, F. C.	Southsea	England.
Sharman, H. B.	Stratford	Perth.
Smith, J. A.	Martintown	Glengarry.
Smith, J. L.	Ottawa	Carleton.
Strange, A. W.	Kingston	Frontenac.
Schwartz, J. A.	Quebec	Quebec.
Saxton, E. A.	Nantwich	England.
Sinclair, A. P.	Montreal	Montreal.
Slater, H.	Taunton	England.
Steers, O.	Ottawa	Carleton.
Soden, F. H.	London	England.
Spohn, H. B.	Lancaster	Wentworth.
Shaw, E. E.	Wolverhampton	England.
Shaw, A. G.	Wolverhampton	England.
Torrance, W. J.	Ottawa	Carleton.
Thomas, F. J.	Oxford	England.
Tourangeau, A.	Quebec	Quebec.
Tucker, H. V.	Toronto	York.
Urmston, R. B.	Southsea	England.
Wark, A. E.	Wanstead	Lambton.
Warren, F. F.	Limmosol	Cyprus.
Weatherston, N. C.	Toronto	York.
Weatherston, D.	Toronto	York.
Westlake, G.	Yarmouth Centre	Elgin.
Weston, G. H.	Ottawa	Carleton.
Willis, W. B.	Whitby	Ontario.
Wilmot, E. M.	London	England.
White, C. D.	Hereford	England.
Whitehead, J.	Brampton	Peel.
Whitehead, R.	Broadstairs.	England.
Wroughton, T.	Montreal	Montreal.
Total		112

APPENDIX 2.

TIME TABLES FOR FALL TERM (1st October to 22nd December), 1882.

Tables No. 1 and No. 2 indicate the work of the regular students, and No. 3 (A) and (B) the work of the specialists in Live Stock, for the term ending the 22nd December, 1882. No. 1 is the same as No. 2, and 3 (A) the same as 3 (B), except the order of the lectures, which change from forenoon to afternoon, and *vice versa* at the beginning of each week, to suit the arrangements for practical work in the outside departments.

TIME TABLE No. 1.

2nd Year.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departm's
Afternoon.	2-3	English Literature.	Statics.	English Literature.	English Literature.	Levelling and Drainage.	Half Holiday.
	3-4	Agricultural Chemistry.	Agricultural Chemistry.	Practical Live Stock.	Meteorology.	Agricultural Chemistry.	
	4-5	Veterinary Pathology.	Agriculture.	English Composition.	Veterinary Pathology.	Practical Horse.	

1st Year—Division I.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departm's
Afternoon.	2-3	Arithmetic.	English Composition.	Agriculture.	2. Arithmetic. 2.40. Book-keeping. 3.20. Human Physiology and Sanitary Science.	Agriculture.	Half Holiday.
	3-4	Agriculture.	Human Physiology and Sanitary Science.	English Literature.		Veterinary Anatomy.	
	4-5	Inorganic Chemistry.	Veterinary Anatomy.	Inorganic Chemistry.	Inorganic Chemistry.	English Literature.	

1st Year—Division II.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	English Composition.	Inorganic Chemistry.	9. Arithmetic. 9.40. Book-keeping. 10.20. Human Physiology and Sanitary Science.	Agriculture.	Arithmetic.	
	10-11	Human Physiology and Sanitary Science.	Agriculture.		English Literature.	Agriculture.	
	11-12	Veterinary Anatomy.	English Literature.	Inorganic Chemistry.	Veterinary Anatomy.	Inorganic Chemistry.	
Afternoon.	1.30-5	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departm's

TIME TABLE No. 2.

2nd Year.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	English Literature.	Statics.	English Literature.	English Literature.	Levelling or Drainage.	
	10-11	Agricultural Chemistry.	Agricultural Chemistry.	Practical Live Stock.	Meteorology.	Agricultural Chemistry.	
	11-12	Veterinary Pathology.	Agriculture.	English Composition.	Veterinary Pathology.	Practical Horse.	
Afternoon.	1.30-5	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside department.	Work in outside departm's

1st Year.—Division I.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	Arithmetic.	English Composition.	Agriculture.	9. Arithmetic. 9.40. Book-keeping. 10.20. Human Physiology and Sanitary Science.	Agriculture.	
	10-11	Agriculture.	Human Physiology and Sanitary Science.	English Literature.		Veterinary Anatomy.	
	11-12	Inorganic Chemistry.	Veterinary Anatomy.	Inorganic Chemistry.	Inorganic Chemistry.	English Literature.	
Afternoon.	1.30-5	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departm'ts

1st Year.—Division II.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.	Work in outside departments.
Afternoon.	2-3	English Composition.	Inorganic Chemistry.	2. Arithmetic. 2.40. Book-keeping.	Agriculture.	Arithmetic.	Half Holiday.
	3-4	Natural History.	Agriculture.	3.20. Natural History.	English Literature.	Agriculture.	
	4-5	Veterinary Anatomy.	English Literature.	Inorganic Chemistry.	Veterinary Anatomy.	Inorganic Chemistry.	

TIME TABLE No. 3.—SPECIAL LIVE STOCK CLASS.

(A) 2ND YEAR.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.
Afternoon.	2-3	Live Stock in Class-room.	Study of Text-Book on Veterinary Practice.	Study of Text-Book on Live Stock.	Live Stock in Class-room.	Study of Text-Book on Live Stock.	Half Holiday.
	3-4	Study of Text-Book on Live Stock.	Veterinary Science or Practice.	Live Stock in Class-room.	Study of Text-Book on Veterinary Practice.	Study of Text-Book on Veterinary Practice.	
	4-5	Veterinary Pathology.	Agriculture.	Veterinary Science or Practice.	Veterinary Pathology.	Practical Horse.	

1ST YEAR.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-12	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.
Afternoon.	2-3	Live Stock in Class-room.	Study of Text-Book on Veterinary Practice.	Agriculture.	Live Stock in Class-room.	Agriculture.	Half Holiday.
	3-4	Agriculture.	Veterinary Science or Practice.	Study of Text-Book on Live Stock.	Study of Text-Book on Veterinary Practice.	Veterinary Anatomy.	
	4-5	Study of Text-Book on Live Stock.	Veterinary Anatomy.	Veterinary Science or Practice.	Study of Text-Book on Live Stock.	Study of Text-Book on Veterinary Practice.	

(B) 2ND YEAR.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	Live Stock in Class-room.	Study of Text-Book on Veterinary Science.	Study of Text-Book on Live Stock.	Live Stock in Class-room.	Study of Text-Book on Live-Stock.	
	10-11	Study of Text-Book on Live Stock.	Veterinary Science or Practice.	Live Stock in Class-room.	Study of Text-Book on Veterinary Practice.	Study of Text-Book on Veterinary Practice.	
	11-12	Veterinary Pathology.	Agriculture.	Veterinary Science or Practice.	Veterinary Pathology.	Practical Horse.	
Afternoon.	1.30-5	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.

1ST YEAR.

	Hours.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.
Forenoon.	7-8	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Study or Recreation.	Half Holiday.
	8-9	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	Drill or Gymnastics.	
	9-10	Live Stock in Class-room.	Study of Text-Book on Veterinary Science.	Agriculture.	Live Stock in Class-room.	Agriculture.	
	10-11	Agriculture.	Veterinary Science or Practice.	Study of Text-Book on Live Stock.	Study of Text-Book on Veterinary Practice.	Veterinary Anatomy.	
	11-12	Study of Text-Book on Live Stock.	Veterinary Anatomy.	Veterinary Science or Practice.	Study of Text-Book on Live Stock.	Study of Text-Book on Veterinary Practice.	
Afternoon.	1.30-5	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.	Work with Cattle, Sheep and Horses.

APPENDIX 3.

ONTARIO AGRICULTURAL COLLEGE.

EXAMINATION PAPERS.

I. PAPERS SET AT THE SESSIONAL EXAMINATIONS, EASTER, 1882.

II. PAPERS SET AT THE SESSIONAL EXAMINATIONS, JUNE, 1882.

III. PAPERS SET AT THE MATRICULATION EXAMINATIONS, OCTOBER, 1882.

1. PAPERS SET AT THE SESSIONAL EXAMINATIONS, EASTER, 1882.

FIRST YEAR.

AGRICULTURE.

Examiner: WILLIAM BROWN.

1. In the following rotation of cropping, give full reasons—theoretical and practical—for its adoption, and point out any weakness in its arrangement:

Peas.	Hay.
Wheat.	Hay.
Wheat.	Pasture.
Roots.	Pasture.
Wheat (seeder).	

2. It is desired to construct a road and fence upon the most approved plan, consistent with economy, efficiency and permanency. Illustrate with diagrams and brief notes.

3. When we want to save labour in management, preserve manure, secure permanency, with healthy conditions—irrespective of cost of construction—in the arrangement of barn, stables, &c., for mixed farming in Ontario, what principles should guide the builder?

FIRST YEAR.

LIVE STOCK.

Examiner: WILLIAM BROWN.

1. What is meant by a pure bred animal, a cross, a grade, and an inside cross, in breeding?

2. Compare the build and characteristics of the Hereford and Aberdeen Poll breeds of cattle.

EASTER EXAMINATIONS, 1882.—Continued.

3. Compare the build and characteristics of the Ayrshire and Jersey breeds of cattle.

4. Classify, price and describe fully the character of the accompanying sample of wool.

5. Make comparative notes on the build and characteristics of the Leicester and Southdown breeds of sheep.

6. Distinguish between the shearling grades of Oxford and Shropshire Down sheep.

FIRST YEAR.

INORGANIC CHEMISTRY.

Examiner: R. B. Hare, Ph.Dr.

1. (i.) How many cubic centimeters of oxygen gas, measured at 15 degrees and 780 mm. pressure, can be obtained by heating 10 grammes of potassium chlorate?
   (ii.) You are given oxygen, nitrous oxide, and nitric oxide gases in separate belljars, how would you proceed to distinguish them?
2. (i.) How would you ascertain the composition of water by volume analytically and synthetically?
   (ii.) Explain the terms "temporary" and "permanent hardness," and state how they may be removed.
3. (i.) Explain the bleaching action of chlorine.
   (ii.) Illustrate by formulæ the chemical action that occurs when the goods to be bleached are first dipped in a solution of *bleaching powder*, and then drawn through dilute hydrochloric or sulphuric acid.
4. (i.) Give the preparation and properties of phosphoric acid.
   (ii.) What important relations do phosphoric and nitric acids hold to agriculture?
5. (i.) Describe the properties of the three allotropic modifications of carbon.
   (ii.) How is carbonic acid related to the animal and the vegetable kingdom?
6. (i.) Give the preparation of hydrochloric and nitric acids.
   (ii.) How would you distinguish them *chemically* and *physically*?
   (iii.) Explain the chemical action of the two acids when united.
7. (i.) How would you prepare soluble and insoluble *silica?*
   (ii.) What occurs when sillicon tetrafluoride is allowed to bubble up in water?
8. Describe and explain any experiment you may have made.

FIRST YEAR.

ORGANIC CHEMISTRY.

Examiner: R. B. Hare, Ph.Dr.

1. (i.) Name some of the chief peculiarities of the carbon compounds.
   (ii.) Explain the terms "saturated" and "non-saturated" carbon compounds, giving examples.
   (iii.) Distinguish empirical from rational formulæ.
2. (i.) Write down a list of the first eight primary alcohols, with their derived acids.
   (ii.) Indicate by structural formulæ the relation existing between an alcohol and the aldehyde, the acid and the ether obtainable from it.
3. Give the preparation and properties of ethyl alcohol.

EASTER EXAMINATIONS, 1882.—Continued.

4. Describe *the continuous etherification process*, using mythl and ethyl alcohol.

5. Explain what is meant by *the acetous fermentation.*
(i.) What is the peculiar test for acetic acid, or the soluble acetates?
(ii.) Give the composition of *red* and *iron liquors*, and explain their use.

6. How are the acids of the lactic series and of the oxalic series derived from the corresponding divalent alcohol or glycols?
(i.) Describe the manufacture of oxalic acid from saw dust.
(ii.) How many grammes of oxygen are required to oxidize a molecule of glycolic acid to oxalic acid?

7. Name the following compounds: $\left.\begin{matrix} C_2H_5 \\ C_2H_5 \\ C_2H_5 \end{matrix}\right\} N$, $\left.\begin{matrix} C_3H_7 \\ H \\ H \end{matrix}\right\} N$,

$\left.\begin{matrix} C_2H_5 \\ C_2H_5 \\ H \end{matrix}\right\} P$, $(CH_3)_3As$, $As_2(CH_3)_4(C_2H_5)_3Sb$,

C_2Cl_3OH, C_3H_6, C_4H_{10}, $C_3H_5O_3(C_{16}H_{31}O)_3$

8. (i.) What is the composition of the natural oils and fats?
(ii.) Explain the old and new process of soap making.

9. What is the action of yeast and dilute sulphuric acid on cane sugar?

FIRST YEAR.

ZOOLOGY.

Examiner: J. Playfair McMurrich, M.A.

1. Describe the structure of the coral animal. Account for the various forms assumed by coral reefs.

2. Classify the following:—Sea-urchin, trichina, cray-fish, iguana, oyster.

3. Describe briefly the life-history of a bee-hive.

4. Mention the characteristics of the *vertebrata.*

5. Give the principal orders of the class *pisces*, mentioning the more important members of each order.

6. Describe the modifications of the heart seen in the *vertebrata.*

7. What are the characteristics of the *ophidia*? Describe some of the more important members of the order.

8. Give the habits of the woodpeckers and robins. Discuss their usefulness from an agricultural point of view.

9. Give the various subdivisons of the order *ungulata*, mentioning some characteristic members of each sudivision. Describe the modifications of the foot in the members of the first sub-order.

FIRST YEAR.

ANATOMY.

Examiner: E. A. A. Grange, V.S.

1. Name the bones of the trunk of the ox.

2. Name the bones of the hind extremity of the ox.

3. Describe the foot of the horse.

EASTER EXAMINATIONS, 1882.—Continued.

4. Name the various processes of digestion, and state where and by what organs each process is performed.

5. Name the structures entering into the formation of a joint.

6. Describe the difference between the preparatory organs of digestion of the horse and ox.

7. Name the organs of respiration.

8. Name the organs of circulation.

9. Give the course of the circulation of the blood through the heart and lungs.

10. Name the layers entering into the formation of the skin.

FIRST YEAR.

ENGLISH LITERATURE.

Examiner: J. P. McMurrich, M.A.

1. Give a short account of Goldsmith's life.

2. "A time there was, ere England's griefs began,
When every rood of ground maintained its man;
For him light labour spread her wholesome store,
Just *gave what* life required, but gave no *more;*
His best companions, innocence and *health.*
And his best riches, ignorance of wealth."

(*a*) Point out the figures of speech in this extract.
(*b*) Write notes on *rood*, *wholesome*, and *innocence.*
(*c*) Parse the words in italic.

3. Describe Goldsmith's style, and compare it with that of Cowper.

4. Give the derivation and original meaning of the following words:—(*a*) accumulate, (*b*) murmur, (*c*) peculiar, (*d*) meandering, (*e*) sycophant.

5. "So once were ranged the sons of ancient Rome,
A noble show! while Roscius trod the stage;
And so, while Garrick, as renowned as he,
The sons of Albion; fearing each to lose
Some note of nature's music from his lips,
And covetous of Shakespeare's beauty, seen
In every flash of his far-beaming eye."

(*a*) Write notes on *Roscius*, *Garrick*, and *Albion.*
(*b*) Parse *show*, *sons of Albion*, *beauty.*

6. (*a*) Me, therefore, studious of laborious ease."
(*b*) "And such thine, in whom
Our British Themis gloried with just cause."
(*c*) "Each claiming truth.
And truth disclaiming both."
Name the figures of speech occurring in the above extracts.

7. Give a synopsis of Cowper's "Task," Bk. III.

8. Write a short account of Cowper's life.

EASTER EXAMINATIONS, 1882.—Continued.

FIRST YEAR.

COMPOSITION.

Examiner: R. B. HARE, PH.DR.

1. Farmers' Houses—what they are and what they might be.

2. "Seest thou a man wise in his own conceit? There is more hope of a fool than of him."

3. "In the sweat of thy face shalt thou eat bread."

4. "Put your trust in God, my boys, and keep your powder dry."

5. "Give me again my hollow tree
A crust of bread and liberty."—(*Horace*).

6. "Who dare think one thing, and another tell,
My heart detests him as the gates of hell."

7. "O wad some power the giftie gie us
To see oursels as others see us,
It wad frae monie a blunder free us
An' foolish notion."

FIRST YEAR.

ARITHMETIC.

Examiner: W. NATTRESS, M.B.

1. A labourer dug 120 rods, 5 yards, 2 feet of ditching, at $2.75 per rod, for which he is to take $110 in cash, and oats at 37½ cents per bushel. To what quantity of oats will he be entitled?

2. Explain how taxes are levied upon property, and for what purposes. When the income tax is 2½ cents on the $, a man pays $62.60. What is his income?

3. $2,500. GUELPH, January 1st, 1879.

Twelve months after date we promise to pay to John Smith, or order, twenty-five hundred dollars, for value received, with interest.

SHELDON & SON.

On June 1st, 1882, what will the above note be worth, reckoning compound interest, at 6 per cent. per annum?

4. Sold an animal for $165 on a credit of 10 months, what should be the cash price, money being worth 8 per cent. per annum?

5. Define *Insurance*, *Premium*, *Policy*. Name the different modes of life assuring. What will be the premium of insurance on the furniture of a house valued at $1,800, at ⅛ per cent.?

6. Three men hire a pasture for their common use for which they pay $212. One puts in 20 oxen for 3 months, another 24 oxen for 4 months and the third 28 oxen for 2 months. How much of the rent should each pay?

7. Draw out a set of Bills of Exchange on the Bank of England for £5,500. What will such a bill cost in Canada if exchange be at 109½?

8. The flooring of a room 14 ft. 3 in. long by 13 ft. 4 in. broad, is composed of planks 3 in. wide and 10 ft. long. How many will be required?

9. Write out the two kinds of negotiable notes bearing interest at 6 per cent.—one for $600, the other for $1,550, and indicate the amount of *bill stamps* required for each. Are any required?

EASTER EXAMINATIONS, 1882.—Continued.

SECOND YEAR.

AGRICULTURE.

Examiner: WILLIAM BROWN.

1. The permanent improvement of a wet, dirty, and impoverished clay loam farm, under mixed husbandry, is to be undertaken, beginning in 1882. What system would you advise, specifiying briefly the nature of the improvements, cropping and manures?

2. Under what circumstances is the extensive application of special fertilizers advisable, and when is their use not attended with beneficial results?

3. What kinds and quantities of grasses and clovers do you recommend for permanent pastures in Ontario, and what are the most favourable conditions for their establishment.

SECOND YEAR.

LIVE STOCK.

Examiner: WILLIAM BROWN.

1. It is desired to obtain the greatest public amount of the best beef at the least cost within three years, under present Ontario grazing conditions, and liberal winter feeding. Which breed of bulls would secure these upon the common Canadian Cows? Give reasons in full.

2. You have handled and compared males of five and females of seven pure breeds of cattle, as also five grades of some. Make a list of these in the order of merit, according to your views of general purpose value in Ontario.

3. Classify, price, and describe in every respect the accompanying sample of wool.

4. Having in view to meet the wants of the present market for mutton and wool, which breed of rams would you place with common ewes upon the natural pastures of our eastern provinces? Give reasons in full.

5. Write the twelve thoroughbred and grade sheep recently handled and compared. Make a list according to wool texture, and opposite each place the value of its shearling ram or wether.

SECOND YEAR.

ARBORICULTURE.

Examiner: WM. BROWN.

The planting of parts of Ontario will entail *expense* and *time* ere anticipated results follow. In what way will these be made good to him who begins in 1882, upon a farm wholly devoid of shelter, and valued then at $5,000?

SECOND YEAR.

AGRICULTURAL CHEMISTRY.

Examiner: J. HOYES PANTON, M.A.

1. Name the Principal Metamorphic rocks which have contributed to the soils of Ontario, the sources from which they have been derived, and the agencies by which they have been distributed.

EASTER EXAMINATIONS, 1882.—Continued.

2. State the principles upon which the rotation of crops depends. What information has been gathered from the investigation of Lawes upon this method of cultivation?

3. Write brief notes upon *potash* and *lime* as manures.

4. Compare the selling price with the estimated value of a fertilizer of which the following is the analysis:

Moisture	8.05.
Organic matter	30.23.
Sol. phos. acid	4.57.
Reverted phos. acid	1.70.
Insol. " "	3.77.
Sulphate of Lime	21.06.
Nitrogen	2.59.
Potash	7.31.

Selling price $45 per ton.

5. Name the different forms in which nitrogen occurs in fertilizers, and state their comparative values.

6. Explain the terms, *nutritive*, *ratio*, *digestion co-efficient*, *ration* and *feeding standard.*

(a) Examine the following daily ration for a milch cow weighing 1,500 pounds:

15 lbs. clover hay.
15 lbs. barley straw.
35 lbs. potatoes.
5 lbs. wheat bran.

(b) How much digestible material can an ox obtain from 24 lbs. of a fodder of the following composition:

Inorganic substance	22.2.
" Water	16.0.
" Ash	6.2.
Albuminoids	14.4.
Crude fibre	33.0.
Carbohydrates	27.9.
Fat	2.5.

Give the "nutritive ratio" of this fodder.

7. Give notes upon the practical importance of a knowledge of the analysis of the ash of plants, and the scientific valuation of fertilizers.

8. Name the different classes of experiments which have occupied the attention of the experiment stations in Germany, with reference to the feeding of animals.

SECOND YEAR.

METEOROLOGY.

Examiner: J. Hoyes Panton, M.A.

1. Explain what is meant by "correction for gravitation" in the barometers What standard is adopted.

2. Describe how the so called storm maps are constructed, and state how they may be of use.

3. Describe a *minimum* thermometer, and reduce 48 degrees F. to C., and—40 degrees C. to F.

EASTER EXAMINATIONS, 1882.—Continued.

4. Explain the absence of trees on prairie lands, and the presence of belts of trese along the rivers.

5. How do you account for the intense cold of districts in the vicinity of lakes, while inland localities at a lower temperature appear much warmer?

6. What are meant by the terms *isothermal, isochimenal,* and *isotheral*? Illustrate by an example their use in determining the climate of a place.

7. Give notes on rainfall, with special reference to its measurement and effects upon the vegetation of a district.

8. What instrument is used for determining the direction, rate and force of the wind? Describe it.

9. Summarize the following observations :

		Bar.	Max. T	Min. T.	Ther.	Rain	Snow.
	7 a.m.	28.146	——degrees.	——degrees.	24.6 degrees.	2.16	6.8
1.	2 p.m.	29.368	—— "	—— "	44.3 "	——	——
	9 p.m.	29.144	45.6 "	8.6 "	28.7 "	——	——
2.	7 a.m.	29.432	—— "	—— "	—5.8 "	——	2.1
	2 p.m.	28.816	—— "	—— "	6.4 "	——	——
	9 p.m.	30.412	26.4 "	—8.7 "	—7.2 "	——	——
3.	7 a.m.	28.004	—— "	—— "	43.2 "	1.68	——
	2 p.m.	28.134	—— "	—— "	49.4 "	——	——
	9 p.m.	28.026	41.2 "	28.6 "	56.3 "	——	——
4.	7 a.m.	29.168	—— "	—— "	24.8 "	——	3.6
	2 p.m.	28.796	—— "	—— "	13.6 "	——	——
	9 p.m.	29.104	24.2 "	—9.6 "	—4.2 "	——	——

SECOND YEAR.

ENTOMOLOGY.

Examiner : J. Playfair McMurrich, M.A.

1. Describe the transformation of insects. Classify the various orders according as their transformation is complete or incomplete.

2. Describe the alimentary system of a beetle.

3. Give the characters of the order Lepidoptera.

4. To what order do the following insects belong :—Cochineal insect, currant borer, wire-worm, cut-worm, Hessian fly, bark louse, pear slug, gooseberry fruit worm, June bug, currant measuring-worm.

5. Give the life history of the gooseberry saw-fly (Nematus ventricosus), and mention remedies for its destruction.

6. Describe the larva and image of Macrosila quinque-maculata. How is it kept in check?

7. Give remedies to prevent the destruction of wheat by the midge (Cecidomyia tritici).

8. Describe the appearance and life history of Aspidiotus conchiformis. What means may be employed for its destruction?

9. Mention the principal insects that affect the currant and gooseberry, stating to which order each belongs.

10. Identify the forms placed before you, and state what plants they affect, and the nature of their injury.

EASTER EXAMINATIONS, 1882.—Continued.

SECOND YEAR.

HORTICULTURE.

Examiner: James Forsyth.

1. Describe the two usual methods of heating horticultural structures. State the temperature required, and how it is regulated.

2. Make a selection of 10 good bedding plants, give the generic name and natural order of each.

3. Make a selection of 6 plants suitable for window culture, giving the technical and common name of each.

4. Explain the process of fertilization in flowering plants. How it is brought about in nature?

5. How are flowering plants hybridized artificially, and for what purpose is it done?

6. How are special varieties of the following fruits perpetuated:—*Apples, plums, gooseberries?*

7. What is understood by monœcious and dicœcious plants? Give an example of each.

8. Give the natural orders of the following genera:—Eupatorium, abutilon, calla, dianthus, eucalyptus, and poinsettia.

9. Describe a soil suitable for potting a large number of greenhouse plants.

10. Name four of the insect pests that usually attack greenhouse plants, and state how they may be destroyed.

11. Give a general description of the construction and management of hot beds, and state the principal advantages to be derived from them.

12. Identify the specimens before you, stating the common name, scientific name, and order of each.

SECOND YEAR.

HIPPOPATHOLOGY.

Examiner: E. A. A. Grange, V.S.

1. Describe the causes, symptoms, and terminations of Inflammation.
2. Name the diseases of bone.
3. Describe the various kinds of fracture, and treatment of the same.
4. Describe the different kinds of wounds, and various modes of healing.
5. Name the natural causes, symptoms and treatment of Epizootic cellulitis (pinkeye).
6. Name the natural causes, symptoms and treatment of Laminitis (founder).
7. " " " " " Spasmodic colic.
8. " " " " " Tetanus (lock jaw).
9. " " " " " Lymphangitis (weed).
10. " " " " " Catarrh.

EASTER EXAMINATIONS, 1882.—Continued.

SECOND YEAR.

BOVINE PATHOLOGY.

Examiner: E. A. A. Grange, V.S.

1. Describe the nature, causes, symptoms and treatment of Hoven.
2. " " " " " Impaction of the rumen.
3. " " " " " Foul in the foot.
4. " " " " " Tuberculosus.
5. " " " " " Foot and mouth disease.
6. " " " " " Choking.
7. " " " " " Pneumonia.
8. " " " " " Sturdy in sheep.
9. " " " " " Foot rot.
10. " " " " " Hoose in calves.

SECOND YEAR.

ENGLISH LITERATURE.

SHAKESPEARE'S "JULIUS CÆSAR" AND "RICHARD II."

Examiner: W. Tytler, B.A.

A. "Julius Cæsar"—Act II., Sc. I.

1. *Brutus*—Give me your hands all over, one by one,
2. *Cassius*—And let us swear our resolution.
3. *Brutus*—No, not on oath: if not the face of men,
4. The sufferance of our souls, the time's abuse,—
5. If these be motives weak, break off betimes,
6. And every man hence to his idle bed;
7. So let high-sighted tyranny range on
8. Till each man drop by lottery. But if these,
9. As I am sure they do, bear fire enough
10. To kindle cowards, and to steal with valour
11. The melting spirits of women, then, countrymen,
12. What need we any spur but our own cause,
13. To prick us to redress? What other bond
14. Than secret Romans that have spoke the word
15. And will not palter? and what other oath
16. Than honesty to honesty engaged
17. That this shall be, or we will fall for it?
18. Swear priests and cowards and men cautelous,
19. Old feeble carrions, and such suffering souls
20. That welcome wrongs.

1. When, where, and under what circumstances were these words spoken?

2. *Your hands* (1. 1)—Mention their names. Meaning of "*all over*"?

3. *If not, &c.* (1. 3)—What does "not" modify? Explain fully what is meant by each of the three "motives" mentioned here.

EASTER EXAMINATIONS, 1882.—Continued.

3. What is the meaning of "high-sighted tyranny" (l. 7).—"range" (l. 7)—"drop by lottery" (l. 8)—"fire enough" (l. 9)—"to steel" (l.10)—"redress" (l.13)—"secret Romans" (l. 14)—"palter" (l.15)—"cautelous" (l.18)—"carrions" (l. 19).

5. *Shall be.....will fall* (l. 17)—What is the meaning of these auxiliaries?

6. *Line 18*—Why are "priests and cowards" specially mentioned by Brutus in this connection?

7. Give a brief account of the events of Act V.

8. State briefly the substance of Anthony's speech over Cæsar's body.

9. What is the source of Shakespeare's Julius Cæsar?

B. "King Richard II"—Act i., Sc. iii.

1. *Bolingbroke*—O, who can hold a fire in his hand
2. By thinking on the frosty Caucasus?
3. Or cloy the hungry edge of appetite
4. By bare imagination of a feast?
5. Or wallow naked in December snow
6. By thinking on fantastic summer's heat?
7. O, no! the apprehension of the good
8. Gives but the greater feeling to the worse;
9. Fell sorrow's tooth doth never rankle more
10. Than when it bites, but lanceth not the sore.
11. *Gaunt*—Come, come, my son, I'll bring thee on thy way.
12. Had I thy youth and cause, I would not stay.

1. *Lines 1 to* 6—What kind of questions? To what are they equivalent?

2. To whose argument is this speech (lines 1 to 10) a reply? What were the arguments?

3. Meaning of "cloy" (l. 3)—"fantastic" (l. 6)—"apprehension" (l. 7)—"felt" (l. 9)—"bring" (l. 11).

4. Explain "bites, but lanceth not" (l. 10).

5. *I would not stay* (l. 12)—Where?

6. Point out any peculiarities of metre, and any rhetorical figures in the extract.

7. Outline briefly that portion of English History included in this play.

8 Classify Shakespeare's plays, and give two examples of each class.

SECOND YEAR.

ENGLISH COMPOSITION.

Examiner: JAS. MILLS, M.A.

Write a composition on one of the following subjects:—

(a) The theatre.

(b) The pleasures of a well-spent life.

(c) Farmers' homes—what they are and what they might be.

(d) Friendly to the best pursuits of man,
Friendly to thought, to virtue, and to peace.
Domestic life in rural leisure spent!—*Cowper.*

EASTER EXAMITATIONS, 1882.—Continued.

(e) Lowliness is young Ambition's ladder,
Whereunto the climber—upward turns his face;
But when he once attains the utmost round,
He then unto the ladder turns his back,
Looks in the clouds, scorning the base degrees
By which he did ascend.—*Shakespeare.*

SECOND YEAR.

POLITICAL ECONOMY.

Examiner: JAMES MILLS, M.A.

1. State the objects aimed at in the study of Political Economy, and name the leading divisions of the subject.

2. Explain the nature and origin of capital, and write explanatory notes on the several requisites of production.

3. "People ought to spend money freely in order to encourage trade." Point out the fallacy in this statement.

4. Write a short article on the *division of labour* as a means of increasing production; show its bearing on trade, and its relation to the tariff of a country.

5. What is profit? What other factors enter into the price of products.

6. Account for the real or apparent disproportion which so often exists between *wages paid* and *work done.*

(a) What are the most effective means of increasing wages?

7. State clearly the difference between *value* and *price.*

8. Discuss—

(a) The English and Canadian systems of land tenure.
(b) Credit cycles as set forth in the following table.

YEARS.

1	2	3	4	5	6	7	8	9	10
Depressed Trade.			Healthy Trade.			Excited Trade.		Bubbles.	Collapse.

(c) The relative advantages and disadvantages of direct and indirect taxation.

(d) The Canadian tariff.

SECOND YEAR.

STATICS.

Examiner: W. NATTRESS, M.B.

1. Name the different ways in which *force* may be exerted.

2. What is the difference between *gravity* and *weight*? Is the weight of a given substance variable? Explain.

EASTER EXAMINATIONS, 1882.—Continued.

3. What must be the condition in order that—
(a) Two forces acting on a body may keep it at rest?
(b) Three forces acting on a body may keep it at rest?
Two forces of 9 lbs. and 12 lbs. respectively, act on a particle at right angles to each other. Find the magnitude and direction of the resultant.

4. What is the *moment* of a force? State the *principle of moments.*

A uniform rod, a foot of which weighs 3 lbs., rests on a fulcrum two feet from one end. What weight suspended from that end will keep it horizontal, when the pressure on the falcrum is 300 lbs.?

5. Define the terms *stable*, *unstable*, and *neutral* equilibrium. Give familiar examples.

6. What are the qualities of a good balance? Define the *common* or Roman steelyard and show how to graduate it.

7. If the radius of the axle be 5 in. and that of the wheel 30 in., what power will be required to raise a bucket of clay, weighing 200 lbs., from the bottom of a well 40 feet deep?

8. Draw a diagram of the *second system of pulleys* having three pulleys in the lower block. State the relation of P. to W. in this system.

9. Draw a diagram of the *Force pump.*

SECOND YEAR.

DRAINING AND LEVELLING.

Examiner: W. Nattress, M.B.

1. A farmer has two sod fields which lie side by side, and present the same appearance as regards slope, elevation, and kind of soil. One, however, has surface drains only, while the other, in addition to these, is thoroughly undrained. For the ensuing season he prepares both fields for a crop of peas. State in contrast the *appearance* and *conditions* of the soil in these fields from the middle of March to the beginning of June during average spring weather,

2. The following is an extract from the Commission Report of 1881:—"In the township of T. G. very little underdraining has been done, *as it is not required.*" Granting this to be true, describe that township with reference to—
(a) Its general contour.
(b) The kinds of soils.

3. Show by plan how you would underdrain Field No. 17, O. E. F.

4. State concisely, assigning your reasons, which of the two following systems of underdraining you would prefer:
(a) Drains 4 ft. deep and 30 ft. apart.
(b) Drains 3 ft. 6 in. deep and 20 feet apart.

5. Name in order of merit the various materials *now* used for underdrains.

6. From the following data, required the height of point A above E, and their distance apart:

Distance of Station—

No. 1,	from	A 210	from	B 215	Back sight	3.5	Fore sight	2.4
" 2,	"	B 350	"	C 340	"	4.3	"	3.2
" 3,	"	C 500	"	D 520	"	2.7	"	8.5
" 4,	"	D 980	"	E 1150	"	7.4	"	9.6

II. PAPERS SET AT THE SESSIONAL EXAMINATIONS, JUNE, 1882.

FIRST YEAR.

AGRICULTURE.

Examiner: W. Brown.

1. Describe the accompanying sample of wheat as regards purity, plumpness, colour, and milling properties, and indicate, with reasons, to what class it belongs.

2. What regulates the quanties of seeding per acre with cereals?

3. Describe the best method of making and preserving farm-yard manure.

4. Give a full description of the work generally required to start a crop of turnips.

5. Make a list of the green fodder crops grown here, in the order of their earliness, giving the quantities in tons usually obtained per season.

6. What is meant by main, lateral, sub-lateral, herring-bone, and sole, in under-drainage?

7. Give seven of the principal points in favour of drainage, and indicate under what circumstances it does damage.

8. Why does Arboriculture require to be studied as a Science and Art in Ontario?

FIRST YEAR.

GEOLOGY.

Examiner: R. B. Hare, Ph.Dr.

1. What relations do Physics, Chemistry, Meteorology, Botany, and Zoology bear to Geology?

2. Distinguish between Crystalline Rocks and Fragmental,
   (i.) In regard to structure.
   (ii.) In regard to mode of formation.

3. What is the *mineralogical* and *chemical* composition of Granite, Syenite, Mica Schist, Hornblendic Schist, Porphyry, and Argillyte?
   (i.) How does *Metamorphic Granite* differ from *Igneous Granite*?
   (ii.) Distinguish between "Common Ponphyry" and "Quartz Ponphyry."
   (iii.) Define "*Schist*" and distinguish it from Slate and Shale.

4. Define the terms: Stratification, layer, stratum, seam, formation, fault, outcrop, dip, strike, and denudation.
   (i.) What are the chief denuding agents?
   (ii.) What necessary relation subsists between the strike and dip of inclined strata?

5. Where and under what geological circumstances do iron, lead and copper ores, auriferous mispickel and apatites occur in Ontario?

6. Name and sketch the geological formations of the "Erie and Huron District" of Ontario.
   (i.) Describe the rocks and fossils of one of them.
   (ii.) In which is the "Oil District Situated?"

7. Why are *coal beds* found in New Brunswick, Nova Scotia, and the North-West Territory, and not in Ontario? Is all the coal of the Dominion of Canada of the same age?

8. Where in Ontario is the *occurrence* of Calciferous, Chazy, Trenton, Utica, Medina, and Clinton Strata characteristics?

9. Name and briefly describe the minerals, rocks and fossils before you.

MIDSUMMER EXAMINATIONS, 1882.—Continued.

FIRST YEAR.

STRUCTURAL AND PHYSIOLOCICAL BOTANY.

Examiner: J. Playfair McMurrich, M.A.

1. Name some of the substances which may be found in a vegetable cell, giving a short description of each.

2. Describe a typical fibro-vascular bundle. Compare the stem of a succulent plant as regards the arrangement of its bundles with that of a tree.

3. What are the various modes of branching? How is its regularity interfered with?

4. Explain the following terms:—*(a)* diœcious, *(b)* monodelphous, *(c)* Raceme, *(d)* anatropous, *(e)* dimorphism.

5. Describe the structure of an ovule, and the process of fertilization.

6. Classify fleshy fruits, give an example of each variety.

7. Name the more important inorganic proximate principles found in plants, stating in each case the source from which they are derived.

8. Describe briefly the process of assimilation in plants.

9. What is meant by metastasis? Give an example.

10. Describe briefly the influence of light on plants.

FIRST YEAR.

MATERIA MEDICA.

Examiner: F. C. Grenside, V. S.

1. Give the different forms in which medicines are administrated to the domesticated animals.

2. Define the terms Ecbolic, Antiseptic, Disinfectant, Sedative, and Aphrodisiac.

3. Give the preparation of Fleming's Tincture of Aconite.

4. Give the actions of Aconite, and mention in what stages of diseases it is used.

5. Give the action of Aloes, and mention dose for each action for horse.

6. In what diseases and condition of the horse is Aloes Contra-indicated?

7. Mention the use, and dose of Areca Nut for dog.

8. What action has Belladonna on the pupil of the eye?

9. Mention the actions of Arsenic given internally, and give dose of Fowler's Solution for horse.

10. By what other name is Liquor Ammoniæ Acetatis spoken of, and mention actions and dose for horses and cattle.

FIRST YEAR.

ENGLISH LITERATURE.

"MARMION."

Examiner: W. Nattress, M.B.

1. When was "Marmion" written? Give a brief outline of the whole story, with a detailed account of the incidents which occur in Canto V.

MIDSUMMER EXAMINATIONS, 1882.—Continued.

2. Briefly sketch Sir Walter Scott's life, and draw an outline map showing his different places of abode.

3. State the causes of the war which terminated in "Flodden Field." Name the different divisions of the Scottish army, and quote or give a synopsis of Scott's description of the Highlander.

4. Critics acknowledged this poem to be—

(a) irregular *(b)* affected *(c)* inaccurate and *(d)* that the character of the hero is unsuited to the age in which he is placed.

Sustain these indictments by quotations, by illustrations, or by argument.

5.

"At night, in secret, there they came,
The Palmer and the holy dame.
The moon among the clouds rose high,
And all the city hum was by.
Upon the street where late before
Did din of war and warriors roar,
You might have heard a pebble fall,
A beetle hum, a cricket sing,
An owlet flap his boding wing
On Gile's steeple tall.

* * * * *

A solemn scene the Abbess chose;
A solemn hour her secret to disclose.

* * * * *

'Now, saintly Palmer, mark my prayer:
I give this packet to thy care,
For thee to stop they will not dare;
And, oh! with cautious speed,
To Wolseley's hand the papers bring,
That he may show them to the king;
And, for thy well-earned meed,
Thou holy man, at Whitby's shrine
A weekly mass shall still be thine,
While priests can sing and read—
What ails't thou?—Speak!' For as he took
The charge a strong emotion shook
His frame; and ere reply,
They heard a faint, yet shrilly tone
Like distant clarion feebly blown,
That on the breeze did die,
And loud the Abbess shrieked in fear,
'Saint Withold, save us!—What is here?
Look at yon City Cross?
See on its battled tower appear
Phantoms, that scutcheons seem to rear,
And blazoned banner toss.'"

(a) Write brief notes on the "The Palmer," "The Abbess." "Wolsey," "Saint Withold," "City Cross."

(b) "I give this packet to thy care." What packet?

(c) Explain the vision cited above, and contrast the use of the supernatural made by Shakespeare in "Macbeth" with this.

MIDSUMMER EXAMINATIONS, 1882.—Continued.

(d) Scan, naming the metre in each case—

"A solemn hour her secret to disclose."
"What ails't thou? Speak!—For as he took."
"Look at yon City Cross."

(e) Point out and name the figures of speech in the extracts. An example of anachronism occurs in the above. Explain.

(f) "You might have heard a pebble fall."

Why so quiet?

6. "But scarce three miles the band *had rode*
When o'er a height they passed.
And *sudden* close before them showed
His towers *Tantallon* vast."

(a) Point out and name the figures of *euphony*, of *syntax*, and of *rhetoric* which occur in this extract.

(b) Describe Tantallon Castle.

(c) Parse the italicised words.

7. Explain the allusions in the following passages:
(a) "The cloth-yard arrows flew like hail."
(b) "The trusty blade Toledo right."
(c) "And did a vestal vot'ress there."
(d) "St. Antony fire thee."

8. "So boldy he entered the Netherby Hall
Among brides-men and kinsmen and brother, and all."

Complete the quotation of this and the two following stanzas.

9. To what characteristics is the popularity of Scott due?

FIRST YEAR.

ENGLISH COMPOSITION.

Examiner: Jas. Mills, M. A.

1. Give rules for the use of the Period and the Colon.
2. Punctuate the following sentences:
(a) Cato being next called on by the counsel for his opinion delivered the following forcible speech
Conscript fathers I perceive that those who have spoken before me &c
(b) Lord Beacon has summed up the whole matter in the following words A little philosophy inclineth mens minds to atheism but depth in philosophy bringeth mens minds to religion.
(c) You have friends to cheer you on you have books and teachers to aid you but after all the proper education of your own mind must be your own work.
3. Write a composition on one of the following subjects:
(1) Honour.
(2) The company one keeps.
(3) The habit of smoking.

MIDSUMMER EXAMINATIONS, 1882.—Continued.

(4) "Full many a gem, of purest ray serene,
The dark unfathomed caves of ocean bear;
Full many a flower is born to blush unseen,
And waste its sweetness on the desert air."

FIRST YEAR.

MENSURATION.

Examiner: W. NATTRESS, M. B.

1. What is the difference between the area of an equilateral triangle whose side is 8 ft., and that of another triangle whose sides are 7, 8 and 9 feet respectively?

2. Find the area of a square field whose diagonal is 10 chains. Divide this field into three equal areas by lines parallel with the diagonal.

3. An oblong field whose sides are as 1 : 2 has a perimeter of 60 chains. Find its area.

4. What do you mean by the *pitch* of a roof? Describe the *common or true pitch*, the *Gothic pitch*, and the *pediment pitch*.

How many bundles of shingles laid 5 in. to the weather will be required for a barn 50 × 90 common pitch?

5. Find the solidity of a log 40 feet long, the diameter of the ends being 4 and 3 ft. respectively. What is the largest square stick which can be hewn out of this log?

6. A cylindrical pail is 14 in. in diameter and 14 in. in height. How often can it be filled with water from a vat, shaped like the fustrum of a cone, whose depth is 10 ft., and area of its ends 30 ft. and 48 ft. respectively?

7. Which will hold more water, a cylindrical cistern 8 ft. in diameter or two similar ones each 5 ft. in diameter?

8. Find the area of a regular heptagon whose side is 6 ft. Apothem whose side is 1 = 1.0382607.

SECOND YEAR.

AGRICULTURE.

Examiner: W. BROWN.

1. On a 400 acre farm in Ontario, under mixed farming, by a seven shift, where cattle and sheep are kept, give the kind and probable produce of each crop annually, specifying what extra crops should be grown for special purposes in connection with first-class management of live stock.

2. Grazing is an art under the best practice. As such, show in what way it should be followed on this farm under its present conditions. Specify particulars.

3. The practice of bare summer fallowing has its advocates and opponents. Give the arguments on each side.

4. Wool as an annual crop in connection with mixed farming in Ontario is changing. What are these changes, the causes for the same, and show to what extent they affect the revenue from 100 acres, on an average?

5. What is farming—theoretically, scientifically and practically? Give an example of their combination.

MIDSUMMER EXAMINATIONS, 1882.—Continued.

SECOND YEAR.

LIVE STOCK.

Examiner: W. Brown.

1. The relative profits of breeding, rearing and feeding cattle and sheep are regulated by various circumstances. What are these as applicable to Ontario?

2. The value of wool for certain manufactures depends upon length, texture, spirals, and serrations. Give, as nearly as possible, in order of latter property, the twelve wools grown by us this year, and opposite the names place indications of the three others.

3. The prematuring of beef is a controverted point as against its slower production. Show in juxtaposition the points affecting the question that arises in the breeding of a Shorthorn Grade from birth to two and three years old respectively.

4. Take Shorthorn and Galloway Grade Steers, trace the following process of each up to $2\frac{1}{2}$ years, and submit a balance sheet.

5. What is Live Stock raising in these times in Ontario?

SECOND YEAR.

ANALYTICAL CHEMISTRY.

Examiner: R. B. Hare, Ph.Dr.

Part.—Lecture Room, Time $1\frac{1}{2}$ hours.

1. Distinguish Gravimetric Analysis from Volumetric. When is Organic Analysis "*Ultimate*," and when "*Proximate*"?

2. Define the terms: *tests, reagents* and *reactions*. How do the operations of analysis *in the dry way* differ from those *in the wet way*?

3. How is the *Specific Gravity* of a liquid determined—

(i.) by means of the specific gravity bottle or piknometer;
(ii.) by means of the areometer or hydrometer?

3. Define "Atomicity" and "Basicity," illustrating each by Formulæ with brief explanations. Is atomicity a fixed property or is it variable.

5. Give a list of the "*Group Reagents*," and describe briefly the conditions connected with their use.

(i.) Explain by formulæ the action of *Yellow Ammonium Sulphide* upon the sulphides of the metals of the *Second Group*.

(ii.) How would you in solution distinguish a ferrous salt from a ferric, a mercurous from a mercuric?

(iii.) Under the conditions of the Third Group, why is ammonic chloride added before ammonic hydrate?

6. How would you analyse *Shell-marl*?

Part II.—Laboratory. Time $1\frac{1}{2}$ hours.

1. Determine the metals and acids present in solution No. 1 *(a), (b), (c)*.

2. Prove the presence of iron in solution No. 2. Give specific tests to prove the form.

3. Prove the presence of Mercury in solution No. 3. Give specific tests to prove the form.

MIDSUMMER EXAMINATIONS, 1882.—Continued.

SECOND YEAR.

SYSTEMATIC AND ECONOMIC BOTANY.

Examiner: J. Playfair McMurrich, M.A.

1. Give a general classification of the Phanerogamia, stating briefly the characters of each group.

2. Describe the life history of the rust fungus (Puccinia graminis).

3. Describe the process of reproduction in ferns. Mention some of the commoner native varieties.

4. Mention the characteristics of the order Palmaceæ. Give some of the more important economic plants of the order, stating the use to which each is put.

5. Name the orders and genera from which our common spices are obtained.

6. Name the order and genera, other than the Gramineæ, used for forage.

7. What are the characteristics of the order Compositæ? Mention six common members of the order.

8. Identify the plants before you.

9. Analyze and identify the plant given you.

SECOND YEAR.

MATERIA MEDICA.

Examiner: F. C. Grenside, V.S.

1. Give dose of Nux Vomica for horse, and mention its principal alkaloid.

2. To what constituent does Oak Bark owe its astringency? Give uses of the bark for cattle and sheep.

3. From what species of plant is Opium obtained, and what is its most important Alkaloid?

4. How much Opium does Laudanum contain? Give dose for horses cattle, sheep, and pigs.

5. Mention actions, uses, and doses of Nitrate of Potash for horses and cattle.

6. In what diseases is Chlorate of Potash of special value?

7. What is the most powerful Sedative known?

8. Of what especial use are Stavesacre Seeds? Give the preparation for that purpose.

9. Mention the different kinds of Turpentine.

10. Give a perscription for Tympanitis in cattle.

SECOND YEAR.

MILTON.

"L'ALLEGRO," AND "IL PENSEROSO."

Examiner: S. C. Smoke, B.A.

(a) "Haste thee, nymph, and bring with thee
Jest and youthful jollity,
Quips and cranks and wanton wiles,
Nods and becks and wreathed smiles
Such as hang on Hebe's cheek,
And love to live in dimple sleek;
Sport, that wrinkled care derides,
And laughter holding both his sides."

MIDSUMMER EXAMINATIONS, 1882.—Continued.

(b) "But let my due feet never fail
To walk the studious cloisters pale,
And love the high embowed roof,
With antic pillars, massy proof,
And storied windows richly dight
Casting a dim religious light."

1. *Nymph.* Who is meant? Give other names and epithets by which she is designated in this poem.

2. Explain the construction of *thee* (after *haste*), *nymph, as, care, Laughter.*

3. *Laughter.....his.* What figure? State on what principles the gender in such cases is determined and exemplify from these poems.

4. Notice variations in the metre of the above extracts.

5. Write a paraphrase of *(b)*.

6. *Studious cloisters pale.* What other reading? Point out the difference in meaning between the two.

7. Quote from these poems passages in which occur the following words: *Fantastic, cynosure, bout, demure.*

8. Give derivation of *quip, dimple, daisy, cynosure, jocund, counterfeit, trophy, cloister, anthem, ecstasy.*

9. Give meaning of *yclep'd, dight, matin, learned sock, bestead, commercing, garish.*

10. "To behold the wandering moon
Riding near her highest noon."

Derive *noon* and show how it obtained the meaning which it has in this passage.

11. Derive the terms L'Allegro and Il Penseroso, and give their meaning. Remark upon the form of the latter.

12. Quote the two closing lines of each of these two poems.

13. Name the poems of Milton in the order in which they were written.

14. Taine says: "Milton was not born for the drama but for the ode." Explain this statement and give your opinion as to its correctness.

SECOND YEAR.

BOOK-KEEPING.

Examiner: W. NATTRESS, M.B.

1. In Farm Book-keeping, what are the several accounts which you think necessary to keep with reference to—

(a) the farm proper;
(b) the household?

2. Bought a thoroughbred Hereford cow. Specify the various items to be recorded in making this entry in your books.

3. Enumerate the different ways in which the debit side of the following accounts may be affected:

(a) Live Stock Account.
(b) Field Account.
(c) Real Estate Account.

4. Enter the following transactions:

(a) Purchased a seed drill for $80—one half cash, the remainder on my note for 60 days.

(b) Imported ten Leicester ewes. Cost price, £2 10s. each (£1 sterling = $4.86\frac{2}{3}$). Freight and other charges, $50.

MIDSUMMER EXAMINATIONS, 1882.—Continued.

(c) One week after landing, four of the animals died.

(d) Selected 100 young maples from the bush, and planted them along the front of the farm. Trees worth 12½ cents each. Cost of labour $10.

(e) Sold for cash from Field No. 6, 400 bush. of barley, at 75c. per bush.

5. Write out a form of the note No 4 *(a)*. A "Bill of Exchange" on the Bank of England for payment of sheep in No. 4 *(b)*. A cheque on the Bank of Commerce for $250.

6. Name the various "Instruments" relating to farm property, which should be recorded at the "Registry Office" of the County. What are your privileges with reference to the searching of titles to lands? State fees.

7. Define *Lease, Deed, Mortgage.*

In what way may the principal secured by a mortgage become due before the expiration of the time for which the mortgage is drawn?

SECOND YEAR.

LAND SURVEYING.

Examiner : W. NATTRESS, M.B.

1. Give a full description of Gunter's chain, and construct a table containing inches, links, chains and acres.

2. Describe a cross staff, an offset staff, a picket, a field-book, and explain the use of the Theodolite.

3. Assuming the accompanying plan to be drawn on a scale of 20 chains to the inch, find the area of *(a)* the whole block of land lying North-East of the Brock Road, *(b)* the Government land only in the same block.

4. Illustrate by rough plan how you would survey Field No. 10 to ascertain its area, and to show the size and position of the two "breaks" as shown in the accompanying plan.

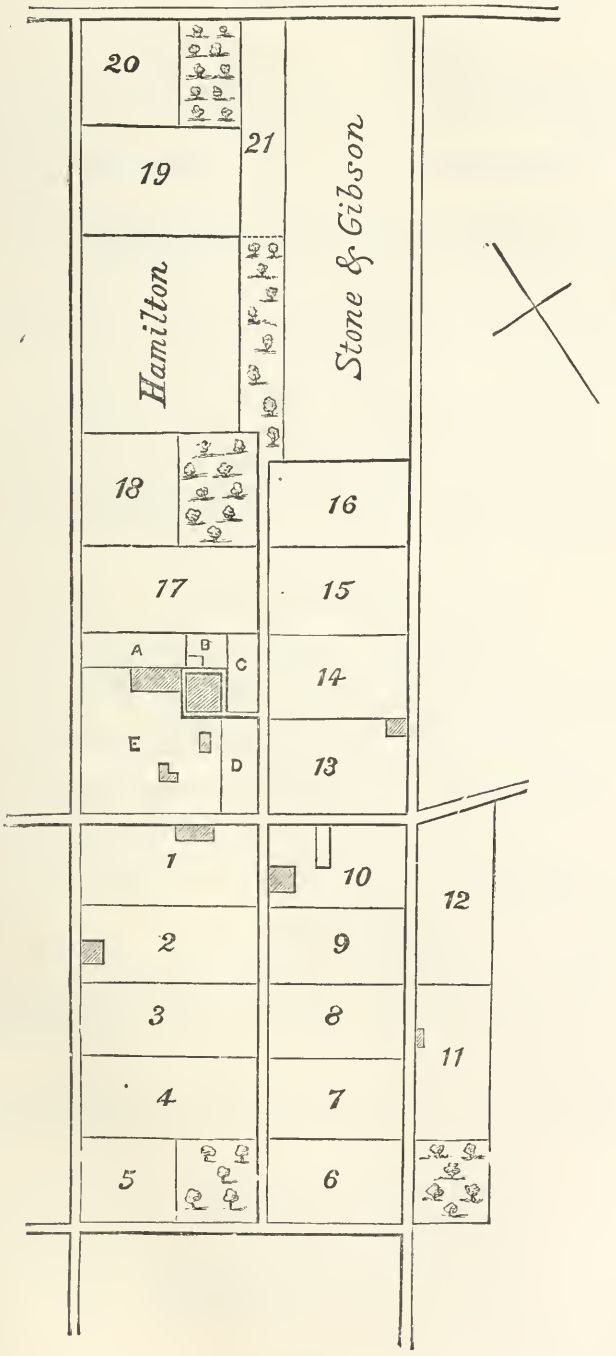
5. Plan the field from the adjoining field-book, scale 2 chains to the inch.

L OFFSET.	CHAIN LINES.	R OFFSET.
to corner of field 400	900 to (3) on lane	200 |
	800	150 |
	650	100 | to ditch.
to fence 600	600	
	500	150 |
	From (1) North.	
o river | 300	400 to (2)	
100	250	
	From (1) West.	

6. Make a rough sketch of the field ABCDE, and calculate its area from the accompanying field-book.

L OFFSET.	CHAIN LINES.	R OFFSET.
	1300 to O E	
to D 960	360	
	From O C	
	1650 to O C	
to B 350	1200	
	400	390 to E
	From O A East.	

MIDSUMMER EXAMINATIONS, 1882.—Continued.



III. PAPERS SET AT THE MATRICULATION EXAMINATIONS, OCTOBER, 1882.

ARITHMETIC.

Examiner: W. Nattress, M.B.

1. What is the cost of paving a court-yard 250 ft. long by 120 ft. wide at 12½c. per square yard?

2. Find the difference in acres between a square mile of land and a piece of land a mile square.

3. How many square yards are there in $\frac{1}{8}$ of a square mile?

4. Find the G. C. M. and L. C. M. of 1260, 18584 and 12960.

5. Reduce $\frac{2\frac{1}{2}-5\text{-}6}{2\frac{1}{2}+5\text{-}6}+\frac{7}{12}$ of $\frac{90}{42}-\frac{22\frac{1}{2}}{30}$ to a simple fraction, and convert .00728 into an equivalent vulgar fraction.

6. How many planks 15 ft. long and 10 in. wide will be required to construct a platform 50 yds. long and 42 ft. broad?

7. A man realizes for his property in England £4000 (£1 sterling = $4.86½). It costs him $\frac{1}{40}$ of this for travelling expenses in going from England to Canada. He then invests $\frac{1}{8}$ of the remainder in farm stock, $1,$½ in household goods, and the remainder in Ontario land at $75 per acre. How much land can he buy?

ENGLISH GRAMMAR.

Examiner: James Mills, M.A.

1. Define the terms, *number*, *case*, *voice*, and *syntax*.

2. State the different modes of indicating gender in English, and give an example of each.

(*a*) Give the feminine terms corresponding to *monk*, *earl*, *marquis*, *executor*.

3. Write out the plural of *cup-ful*, *aid-de-camp*, *mussulman*, *analysis*, *grotto*, and *Mr.*

4. Decline *I*, *she*, and *who*.

5. Conjugate *shall* and *will* interrogatively.

6. Correct mistakes in the following sentences:

(*a*) The doctor said that fever always produced thirst.

(*b*) As neither George nor Alexander are going, let you and I go.

(*c*) Who does it belong to?

(*d*) He rode to town, and drove six cows, on horseback.

7. Divide the following passage into simple sentences, stating the kind and connection of each:

"It was a summer *evening*.
Old Kasper's work *was done*,
And he *before* his cottage door
Was sitting in the sun,
And by him *sported* on the green
His little grandchild *Wilhelmine*."

(*a*) Parse the Italicised words.

MATRICULATION EXAMINATIONS, 1882.—Continued.

GEOGRAPHY.

Examiner: J. Playfair McMurrich, M.A.

1. What is meant by a river-basin? Draw a map of North America, showing the basins of the large rivers.

2. Where are the following towns, and for what are they noted:—Leeds, Dresden, Simla, Xerxes, Lyons?

3. In what Counties of Ontario are the following towns:—Goderich, Cornwall, Sandwich, Kingston and Belleville?

4. State accurately the boundaries of the Province of Quebec as it now stands.

5. Name the principal rivers of New Brunswick, giving the chief towns on their banks.

6. What and where are the following:—Hindoo-Koosh, Volga, Colombo, Heligoland, Mareotis, Potomac, Mecca, Anticostic, Bab-el-mandeb, Teneriffe.

COMPOSITION.

Examiner: R. B. Hare, Ph.Dr.

Write a composition on one of the following subjects:—

(a) A description of your home and its surroundings.

(b) A letter to a friend, giving some account of your summer's work and amusements.

(c) The best indication of man's tastes and character is the company he keeps.

DICTATION AND READING.

Examiner: R. B. Hare, Ph.Dr.

Dictation.—Fourth Book, p. 117—"Trees.....straight line."
Reading.—Fourth Book, p. 117—"Immediately.....can tell."

APPENDIX 4.

ONTARIO AGRICULTURAL COLLEGE.

CLASS LISTS.

I. Easter Examinations, 1882. II. Midsummer Examinations, 1882.

I. Easter Examinations, 1882.

FIRST YEAR.

Classes.	Agriculture.	Live Stock.	Practical Handling and Judging of Cattle.	Practical Handling and Judging of Sheep.	Inorganic Chemistry.
Honours. I.	1 McKercher, W. 2 Hopkins, J. A. 3 Robinson, J. D. / Hutton, J. R. 5 Jeffs, H. B. 6 Bowes, J. B.	1 McKercher 2 Robinson 3 DeVeber / Jeffs 5 Bowes, J B / Clark, C. / Torrance 8 Hopkins / Hutton, J. R. / Eidt / Willis / Minard / Magor 14 Raikes	1 Torrance 2 Stevenson / Fotheringham 4 Thomas	1 Strange 2 Garland	1 Hutton, J. R. 2 McKercher 3 Lough / Greenlaw .....
Honours. II.	1 Clark, C. 2 Raikes, H. 3 Eidt, W. / Minard, W. 5 Frith, H. 6 Magor, J. F. 7 Creelman, J. A. 8 Greenlaw, F. W. 9 Perry, D. E. 10 Garland, C. S, / Dickinson, G. A. 12 Willis, W. B. 13 Lough, W. H. / Cutting, A. N. / McLennan, D. / Smith, F. W. / Newport, E. F.	1 Dickinson / Broughton / M'Pherson / Lough 19 Raynes / Creelman / Frith 5 Smith, F. W. / Fothering-ham 22 Gregory / Riddell / Garland / Maunsell / McLennan 7 Thomas / Begg / Smith, J A 27 Messecar 28 Carnegie 10 Gillespie / Cutting / Greenlaw 29 Pope, A. H. 13 Newport 14 Robertson / Perry / Bowes, J. C. / McKim / McNish	1 Hutton, W. E. / McNish / Perry 17 Willis / Dickinson 22 Carnegie / Gillespie / Neilson 4 Tourangeau / Bowes, J. B. / Hopkins / McKim / McKercher 25 Minard / Lough / Robertson / McPherson / Holcroft / Gregory / Rowes, J. C. / Maunsell 9 Smith, F. W. / Luton / Eidt / Hutton, J. R. 13 Raikes 14 Strange / Jeffs / Cowley 33 Magor / Smith, J. A. / Ryall / Creelman / Schwartz / McLennan 17 Riddell / Greenlaw / Robinson	1 Clark, F. / Greenlaw 3 Bowes, J. B. / Jeffs 20 Perry / McKercher / Thomas / Frith / Tourangeau / Messecar 5 Hopkins 6 Carnegie / Fothering-ham / Gregory / McNish / Robinson 26 Neilson / Newport / Minard / Eidt / Robertson / Morton / Luton / DeVeber / Ord / McLennan / Maunsell / Broughton 11 Creelman / Bowes, J. C. / Smith, F. W. / Hutton, W. E. / Hutton, J R / McPherson / Raikes / Torrance 29 19 Stevenson	1 Hopkins / Thomas 3 Gregory / Hutton, W. E. 5 Minard 6 Perry / Major 8 Dickinson / Clark, F. .....

6 (E.)

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Class Lists: Easter, 1882.

FIRST YEAR—*Continued.*

Classes.	Organic Chemistry.	Zoology.	Veterinary Anatomy.	English Literature.	English Composition.
Honours. I.	1 Hutton 2 Hopkins 3 Perry, Minard 5 Thomas	1 Thomas 2 Bowes, J. C. 3 Hutton, J. R.	1 McKercher 2 Thomas 3 Hutton, J. R. 4 Raikes 5 Ord 6 Lough	1 Clark, F., Fotheringham 3 Raikes 4 Hutton, J. R.	1 Greenlaw 2 Hutton, J. R. 3 McKercher 4 Fotheringham ....
Honours. II.	1 McKercher, Torrance, Hutton, W. E., Willis 5 Greenlaw 6 Strange, Maunsell 8 Bowes, J. C. 9 Robertson 10 Dickinson 11 Lough	1 Fotheringham 2 Perry 3 Robertson, Hopkins 5 Stevenson 6 McKercher 7 Strange 8 Hutton, W. E. 9 Creelman 10 Lough, DeVeber 12 Garland 13 Major 14 Torrance 15 Bowes, J. B. 16 Willis	1 Jeffs 2 Greenlaw 3 Torrance 4 Perry 5 Minard 6 Hutton, W. E. 7 Maunsell 8 Cutting 9 McLennan, J., Neilson 11 Robertson 12 Clark, F., Morton, Clark, C.	1 Thomas 2 Bowes, J. C. 3 Robertson 4 Hopkins 5 Major 6 Perry 7 McKercher 8 Willis 9 Joseph 10 Ryall 11 Greenlaw 12 Maunsell 13 Minard 14 Torrance	1 Major 2 Lough 3 Minard 4 Gregory 5 Willis 6 Thomas 7 Hutton, W. E. 8 Hopkins 9 Clark, F. 10 Robertson 11 Raikes 12 Bowes, J. C. ....
Pass. III.	1 Gregory 2 McNish 3 Clark, F. 4 Stevenson, Clark, C., Schwartz 7 Raikes	1 Maunsell, McNish, Maughan, Clark, C. 5 Jeffs 6 Neilson 7 Dickinson	1 Willis 2 Maughan 3 McNish 4 Major, Gregory 6 Fotheringham, Dickinson	1 McPherson, Maughan, Hutton, W. E., Newport 5 Lough 6 Edmondson 7 Stevenson	1 Perry, Torrance, DeVeber 4 Law 5 Garland 6 Bowes, J. B. 7 Maunsell

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CLASS LISTS: EASTER, 1882.

FIRST YEAR—*Continued.*

Classes.		Arithmetic.	General Proficiency.	Departments.		FIRST CLASS MEN IN THE DEPARTMENTS.
Honours.	I.	1 McKercher, Bowes, J. C. 3 Hutton, J. R. 4 Hopkins, Minard 6 Clark, F. 7 Willis, McPherson 9 Robertson 10 Stevenson	1 Hutton, J. R. 2 McKercher, W. 3 Hopkins, J. A., Thomas, F. J.	I.	Agriculture and Live Stock.	1 Kercher, W.
	II.	1 Fotheringham 2 Gregory 3 Jeffs 4 Rose 5 McNish 6 Dickinson 7 Raikes 8 Gillespie, Creelman, Torrance 11 Perry 12 Thomas 13 Robinson 14 Hutton, W. E., McDonald, Maughan 17 Ryall	1 Minard, W. F. 2 Greenlaw, F. W. C. 3 Perry, D. E. 4 Raikes, H. 5 Torrance, W. J. 6 Jeffs, H. B. 7 Willis, W. B. 8 Hutton, W. E. 9 Fotheringham, W. 10 Bowes, J. C. 11 Robertson, W. 12 Clark, F. 13 Strange, A. W. 14 Gregory, J.	II.	Natural Science.	1 Hutton, J. R. 2 Hopkins,
Pass.	III.	1 Smith, J. A., Greenlaw 3 Lough 4 Maunsell, Strange, Carnegie 7 Joseph 8 Schwartz 9 Broughton 10 Thomas 11 Newport 12 Magor 13 McKim 14 Cowley, Smith, J. L. 16 Garland, Smith, F. W. 18 Clark, C., Frith, Eidt, King, Morton, Kestell, Begg 25 Tourangeau	1 McPherson, D. 2 McNish, C. H. 3 Stevenson, C. R. 4 Clark, C. 5 Bowes, J. B. 6 Garland, C. S. ....

CLASS LISTS: EASTER, 1882.

FIRST YEAR—*Continued.*

Classes.	Arithmetic.	General Proficiency.	Departments.	FIRST CLASS MEN IN THE DEPARTMENTS.
Pass. III.	Edmondson	.....	V. Mathematics.	1 McKercher, W. / Bowes, J. C.
	Messecar	.....		
	Holcroft	.....		
	Fraser	.....		3 Hutton, J. R.
	DeVeber	.....		
	Major	.....		4 Hopkins, J. A. / Minard, W. F.
	Raynes	.....		
	Pope	.....		
	Law	.....		6 Clark, F.
	Ord	.....		
	Cutting	.....		7 Willis, W. B. / McPherson, D.
	Jones	.....		
	Gilpin	.....		
	McLennan	.....		9 Robertson, W.
	Neilson	.....		
	Havard	.....		10 Stevenson, C. R.

☞ Names unnumbered are those of students who have failed to pass in the subject.

Only those who pass in every subject are ranked in general proficiency.

First-class men in general proficiency must obtain at least 67 per cent. of the total number of marks; second-class men, at least 50 per cent. of the total number of marks. First-class men in any department must obtain at least 75 per cent. of the marks allotted to the subjects in that department.

Class Lists: Easter, 1882.

SECOND YEAR.

Classes.	Agriculture.	Arboriculture.	Live Stock.	Practical Handling and Judging of Cattle.	Practical Handling and Judging of Sheep.
Honours. I.	1 Howitt, W. 1 Shuttleworth, A. 3 Wettlaufer, F. 4 Stover, W. J.	1 Howitt 2 Shuttleworth 3 Wettlaufer 4 Chase 5 Dawson 6 Philbin, Shearer, Ramsay, Williams	1 Howitt 2 Ramsay	1 Howitt 2 Wettlaufer	1 Dawson 2 Howitt
Honours. II.	1 Bignell, E. 2 Philbin, T. R. 3 Duthie, J. 4 Barclay, E. H. 5 Ramsay, R. A. 6 Bowman, B. 7 Chase, O. 8 White, W. G. 9 Blanchard, M. G. 10 Dennis, J. / Bethune, K. 12 Dawson, J. / Williams, A. W. 14 Goold, G. E. 15 Elworthy, R. H. / Shearer, E.	1 Bignell / Stover 3 Mahony 4 White, W. G. / White, C. D. 6 Dennis / Elworthy 8 Bowman / Duthie 10 Barclay / Hallesy 12 Silverthorne 13 Goold 14 Gilpin 15 Bethune	1 Chase 2 Blanchard 3 Shuttleworth / Wettlaufer 5 Silverthorne 6 Stover 7 White, C. D. 8 Bowman 9 Bethune 10 Duthie / Mahony / Williams 13 Hallesy / Barclay 15 White, W. G. 16 Pope, E. 17 Dawson / Dennis	1 Stover 2 Barclay 3 Blanchard 4 Shuttleworth / Duthie / Ramsay 7 Hallesy 8 Bowman 9 Philbin 10 Shearer 11 Dawson / Chase 13 Mahony / Silverthorne / Bignell / Gilpin 17 Dennis 18 Pope, E. / White, W. G. 20 Williams / Elworthy 22 Goold.	1 Barclay 2 Duthie 3 White, W. G. 4 Wettlaufer / Stover 6 Shuttleworth / Chase 8 Bignell 9 Bowman / Blanchard 11 Gilpin 12 Philbin 13 Ramsay 14 Silverthorne 15 Shearer 16 Hallesy / Williams
Pass. III.	1 Hallesy, F. 2 Gilpin, W. 3 Silverthorne, N. 4 Pope, E. 5 White, C. D. 6 Mahony, E. C.	Pope, E. Blanchard.	1 Goold / Gilpin 3 Philbin 4 Bignell 5 Shearer / Elworthy	1 Bethune 2 White, C. D.	1 Mahony 2 Goold / Pope, E. 4 White, C. D. 5 Bethune / Dennis 7 Elworthy.

☞ Names unnumbered are those of Students who have failed to pass in the subject.
The minimum for first-class honours is 75 per cent.; for second class honours, 50 per cent.; for pass, 33 per cent.

Class List: Easter, 1882.

SECOND YEAR—*Continued.*

Class.		Agriculture.	Meteorology.	Entomology.	Horticulture.	Bovine Pathology.
Honors.	I.	1 Howitt	1 Howitt 2 Wettlaufer 3 Chase	1 Howitt 2 Stover	1 Wettlaufer 2 Howitt	1 Wettlaufer 2 Howitt 3 Shuttleworth 4 Ramsay 5 Blanchard
	II.	1 Stover 2 Wettlaufer 3 Shuttleworth 4 Chase 5 { Ramsay / Dennis 7 Philbin 8 Shearer 9 Bignell	1 Bignell 2 Shuttleworth 3 Ramsay 4 Dennis 5 Stover 6 Barclay 7 Gilpin 8 Williams 9 Shearer	1 Shuttleworth 2 Whettlaufer 3 Silverthorne 4 Chase 5 Bignell 6 Ramsay 7 Mahony	1 { Stover / Shuttleworth 3 { Ramsay / Bignell 5 White, W. G. 6 Chase 7 Silverthorne 8 Blanchard 9 Elworthy 10 { Bowman / White, C. D.	1 Philbin 2 Chase 3 Bethune 4 Stover 5 Dawson 6 { Mahony / White, C. D. 8 Duthie 9 Barclay 10 Silverthorne 11 Dennis 12 { Gilpin / Bignell 14 Hallesy 15 White, W. G.
Pass.	III.	1 White, C. D. 2 { Bowman / Barclay 4 White, W. G. 5 { Williams / Blanchard 7 Silverthorne 8 Bethune 9 Gilpin 10 { Dawson / Elworthy 12 Mahony 13 Hallesy 15 Duthie 14 Goold 16 Pope, E.	1 White, W. G. 2 Bowman 3 Mahony 4 Elworthy 5 White, C. D. 6 Bethune 7 Silverthorne 8 Hallesy 9 Goold 10 Duthie 11 Dawson 12 Blanchard Philbin Pope, E.	1 Bowman 2 Hallesy 3 Dawson 4 Shearer 5 White, C. D. 6 Dennis 7 Bethune Williams White, W. G. Gilpin Pope, E. Elworthy Barclay Duthie Philbin Goold Blanchard	1 Dennis 2 Gilpin 3 Mahony 4 Bethune 5 Shearer 6 Dawson Williams Pope, E. Duthie Goold Hallesy Philbin Barclay	1 { Williams / Elworthy 3 Bowman 4 Goold 5 Shearer 6 Pope, E. ....

☞ Names unnumbered are those of Students who have failed to pass in the subject.

The minimum for first-class honours is 75 per cent.; for second-class honours, 50 per cent.; for pass, 33 per cent.

APPENDIX 5.

FINANCIAL TABLES.

1.—Appropriation Expenditure for 1882.

2.—College Revenue for 1882.

3.—College account with Farm and Garden for 1882.

4.—Estimated Expenditure for 1883.

ONTARIO AGRICULTURAL COLLEGE.

1. APPROPRIATION EXPENDITURE FOR 1882.

A.—*Maintenance Account.*	$ c.	$ c.
I.—*Salaries and Wages*	12,108 73	
II.—*Food.*		
Meat, fish and fowl	4,399 81	
Bread and biscuits	1,102 91	
Groceries, butter and fruit	4,256 57	
III.—*Household Expenses.*		
Fuel	2,664 78	
Light	952 75	
Laundry, soap and cleaning	231 45	
Furniture and furnishings	713 27	
Repairs and alterations	597 84	
Women servants' wages	1,728 94	
IV.—*Business Department.*		
Advertising, printing, postage and stationery	797 18	
V.—*Miscellaneous.*		
Maintenance of chemicals	147 65	
Library	75 19	
Unenumerated	887 31	
VI.—*Water for College and Farm* (from city water works)	710 41	
		31,374 79
B.—*Capital Account.*		
I.—Fire proof safe for books, papers, etc	271 00	
		271 00
		31,645 79

2. COLLEGE REVENUE FOR 1882.

	$ c.	$ c.
Tuition fees	3,670 00	
Balances on board accounts	4,936 16	
Supplemental Examinations	31 00	
		8,637 16

3. COLLEGE ACCOUNT WITH FARM AND GARDEN FOR 1882.

(a) With Farm.	$ c.	$ c.	$ c.
Dr.			
To Potatoes .....172 bags .....@	0 85	146 20	
" .....200 "	0 55	110 00	
Turnips..... 24½ "	0 12½	3 31	
Wood		36 00	
Milk..... ... 3,673 gallons @ 14c. (less cost of milking)...		295 84	
Flour .... 28¼ barrels.....	5 10	145 05	
Keep of College horse		100 00	
Cartage for College.....		30 00	
Carpenter's work.....		60 00	
			926 40
(b) With Garden.			
Dr.			
To Apples.... .... 28 bushels	0 50	14 00	
" .... 25⅜ barrels (most of them fallen).....	1 30	33 47	
Crab apples..... ½ bushel.....	0 60	0 30	
Asparagus.....431 bunches.....	0 02	8 62	
" ....400 "	0 01	4 00	
Beets..... 12 bushels	0 40	4 80	
Beans (in pod) ..... 10¼ "	1 00	10 25	
Celery.....528 heads.....	0 05	26 40	
Carrots..... 3½ bushels	0 25	8 62	
Cabbage .... 59⅔ dozen	0 40	23 97	
Cauliflower ..... 30½ "	0 84	25 64	
Corn..... 26½ "	0 12½	3 31	
Cucumbers ..... 9½ "	0 25	2 37	
" (pickling). 17 bushels	2 00	34 00	
Citron..... ..... 6½ dozen	0 48	3 12	
Currants (red) .. .... 12 quarts	0 07	0 84	
" (white) .... 12 "	0 07	0 84	
" (black) .....248 "	0 07	17 36	
Collection of herbs..		2 00	
Gooseberries .....283 quarts	0 04	11 32	
Grapes .... 3½ bushels	2 25	7 87	
Lettuce ....324 heads.....	0 04	12 96	
Onions ..... 21¼ bushels	1 00	21 25	
Parsnips ..... 25¼ "	0 35	8 84	
Peas (in pod)..... 10½ "	0 70	11 38	
Pears ..... 7¾ "	1 50	11 98	
Potatoes..... 44 "	0 60	26 40	
" .....100 "	0 40	40 00	
Radishes ..... 18 bunches.....	0 05	0 90	
Rhubarb.....		18 00	
Raspberries... ..... 74 boxes.....	0 10	7 40	
Spinach .... 25 bushels	0 50	12 50	
Strawberries..... 27 boxes.....	0 10	2 70	
Squash . ..... 19⅓ dozen.....	0 25	4 87	
Tomatoes..... 42¾ bushels	0 30	12 86	
			435 14*
			1,361 54
Cr.			
By Amount deducted from students' board bills for work done in outside departments	.....	4,421 68	
			4,421 68
By Balance	....	.....	3,020 14

* According to the figures of the gardener, who observed the markets more closely, the amount should be $625.16.

4. ESTIMATED EXPENDITURE FOR 1882.

	Voted for 1882.	Required for 1883.	
I.—College and Boarding-House.	126 Students.	126 Students.	
(a) Salaries and Wages.	$ c.	$ c.	$ c.
President, Resident Master, Professor of English Literature and Political Economy	2,000 00	2,000 00	
Professor of Agriculture and Farm Superintendent	2,000 00	2,000 00	
Professor of Chemistry, Geology and Meteorology; Librarian (formerly boarded and lodged in College)	1,200 00	1,500 00	
Professor of Biology and Horticulture (formerly boarded and lodged in College)	1,000 00	1,300 00	
Professor of Veterinary Science	600 00	600 00	
Mathematical and Assistant Resident Master	750 00	600 00	
Bursar	800 00	800 00	
Physician	300 00	300 00	
Instructor in Drill and Gymnastics	150 00		
Steward, Storekeeper, and Instructor in Drill and Gymnastics		500 00	
Matron and Housekeeper	400 00	400 00	
Engineer	600 00	600 00	
Assistant Engineer—six months	198 00	198 00	
Stoker and Night Watchman—six months	120 00	120 00	
Janitor and Messenger ($15 per month)	150 00	180 00	
Temporary assistance	100 00	100 00	
	10,368 00		11,198 00
(b) Expenses of Boarding-House.			
Meat, fish and fowl	4,000 00	4,300 00	
Bread and biscuit	1,500 00	1,500 00	
Groceries, Butter and fruit	4,200 00	4,200 00	
Fuel	2,400 00	2,600 00	
Light	1,000 00	1,000 00	
Laundry, soap and cleaning	300 00	300 00	
Furniture and furnishing	550 00	550 00	
Repairs and alterations	650 00	650 00	
Women servants for boarding-house—cooks, laundresses, etc	1,750 00	1,750 00	
Advertising, printing, postage and stationery	600 00	600 00	
Maintenance of Chemicals	150 00	150 00	
Library (books, papers and periodicals)	200 00	200 00	
Unenumerated	700 00	700 00	
	28,368 00	29,298 00	
Less revenue (fees and ballances on account of board)	8,500 00	9,000 00	
	19,868 00	20,698 00	20,698 00
II.—Experimental Farm.			
Farm Foreman	600 00	600 00	
Garden Foreman	600 00	600 00	
Mechanical Foreman	600 00	600 00	
Experiments (labour, seeds, manures, etc.)	1,500 00	1,500 00	
	23,168 00	23,598 00	3,300 00
			23,998 00

APPENDIX 6.

DESCRIPTION OF BUILDINGS, Etc.

Prepared by the Architect of the Public Works Department, January, 1881.

The farm, containing 550 acres, was purchased from Mr. F. W. Stone, Guelph, in 1873, for the sum of $75,000, and is situated on the Dundas road, about one mile from the City of Guelph.

The buildings have been erected on an elevated portion of the Farm, on the north side of the Dundas road, commanding an extensive view of the surrounding country and the City of Guelph. The principal entrance is from the Dundas road, at the south-west angle of the grounds in front of the buildings, which have been skilfully planted ; the hot-houses and horticultural gardens being in the south-east part of the premises, and having a separate entrance on the Dundas road.

The original building, to which additions have been made according to the requirements of the College, as the number of pupils increased, consisted of a stone dwelling-house, 53 feet by 39 feet, with addition in the rear for kitchen, laundry, etc., 60 feet by 24 feet, the whole being two stories in height.

Commodious farm buildings of stone and wood, with enclosed yards, also stone, brick, and wood farm houses, were also on the premises when purchased, and the lots were surrounded by good post and rail fences. The greater portion of the lots were cleared and well cultivated, the remaining portions being wooded and retained for ordinary farm requirements.

The following additions were made from time to time to the original dwelling-house :— Dining, reading, and class-rooms, also a lavatory, laundry, steam-heating apparatus, and apartments for the domestics were constructed in 1873-74, the College having been opened in the latter year. Apartments for twenty-eight pupils were fitted up in the stone farm-house, in the front portion of the grounds. This building was burnt down in February last year, and the walls were so much injured that it has not been reconstructed.

In 1875 a mansard roof was constructed over the front portion, and at a distance of 50 feet on the south-east side, the College authorities erected a building 40 feet by 50 feet, two stories in height, with mansard roof, for lecture and class-rooms.

An addition, 94 feet in length by 50 feet in width, two stories in height, with mansard roof, was made on the north-west side in 1877, affording accomodation for thirty additional pupils, with a new dining-room, also apartments for the Professor of Agriculture. A cheese factory was also erected south of the Dundas road. Further additions were made in 1879 and 1880, consisting of store-rooms, Matron's and domestic apartments, also a larger dining-room, 62 feet by 40 feet, and dormitories for sixty additional pupils, making, in all, apartments for 130 pupils, with larger reading-room and library, baths and wash-rooms, all being heated by steam, on the direct low-pressure principle, by means of coils and radiators ; a new boiler-house, 38 feet by 24 feet, containing two large steam boilers, with coal-house attached, having been constructed for the purpose.

Arrangements were made with the City Water Works of Guelph to extend their mains to the buildings during 1881, when water was supplied for the requirements of the College, thereby saving the cost of pumping, and the buildings will be protected from fire by means of hydrants in the grounds, the necessary fire hose and reel having been provided.

The City Gas Company of Guelph extended their mains to the buildings during 1880, and all the apartments were supplied with gas-light. The buildings, now completed, occupy a space of 240 feet in front by 180 feet in depth, and contain a reception-room and office, four large class and lecture-rooms, with dining and reading-rooms, library, domitories for-

130 pupils, bath-rooms and lavatories, and apartments for the President, Assistant Master and Bursar; also Matron's and servants' rooms.

The perspective view shown on frontispiece, and the accompanying plans, which have been prepared in the Department, will explain the arrangement, dimensions and relative position of the various apartments, also the external appearance of the building, which now presents more of a public character than might have been expected, considering the basis on which the various superstructures were erected.

Further improvements were made in 1881, to complete the furnishing and other internal arrangements, and render the buildings suitable in all respects for the requirements of the College.

The total cost of land and buildings, furniture, live stock, implements, drainage, etc., to the end of 1880, amounted to $225,889,46.

During 1882, residences were erected near the western portion of the buildings, for the Professor of Agriculture and Bursar, the former containing twelve rooms, and the latter nine rooms, both being of stone and roofed with slate, and supplied with water and gas.

Cottages for the Gardener and Farmer were also erected on the eastern portion of the grounds, containing eight rooms, with wood-sheds, etc.; both having been built of stone and roofed with slate. The water supply was extended to these cottages and to the garden and grounds.

Litographs of the proposed Conservatory and Lecture-room, also of the alterations of the grounds in front of the buildings, as designed by Messrs. Miller and Yates, of Philadelphia, are attached to the Report.

APPENDIX 7.

ACT OF INCORPORATION.

As the Act of Incorporation passed by the Legislative Assembly of the Province of Ontario, on the 11th February, 1880, defines somewhat minutely the work of the College and the Farm, it is here quoted for the information of those who may wish to know the objects for which the Institution is maintained :—

No. 60.] BILL. [1880.

AN ACT RESPECTING THE AGRICULTURAL COLLEGE.

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows :—

1. The School of Agriculture, heretofore established in the county of Wellington, in this Province, for instruction in the theory and practice of agriculture, horticulture and arboriculture, and the conducting of experiments relating thereto, is hereby continued, at its present site, under the name of the "Ontario Agricultural College and Experimental Farm." School of Agriculture continued. Site. Name.

2. The said college shall be furnished with all appliances, such as land, buildings, implements, tools and apparatus generally, as may be necessary for theoretical and practical education in agriculture, horticulture and arboriculture, and the course of instruction therein shall be with reference to the following subjects :— Nature of instruction.

(1) The theory and practice of agriculture ;

(2) The theory and practice of horticulture ;

(3) The theory and practice of arboriculture ;

(4) The elements of the various sciences, especially chemistry (theoretical and practical), applicable to agriculture and horticulture ;

(5) The technical English and mathematical branches requisite for an intelligent and successful performance of the business of agriculture and horticulture ;

(6) The anatomy, physiology, and pathology, of the ordinary farm animals; with the characteristics of the different varieties of each kind ; with the management thereof in the breeding, raising, fattening and marketing of each, and with a knowledge of the cheese and butter factory systems ;

(7) The principles of construction and skilful use of the different varieties of buildings, fences, drainage systems, and other permanent improvements, machinery, implements, tools and appliances necessary in agricultural and horticultural pursuits ;

(8) And such other subjects as will promote a knowledge of the theory and practice of agriculture, horticulture and arboriculture.

3. The education and instruction shall be at once theoretical and practical, the former known as a course of study, and the latter as a course of apprenticeship ; and a time, not less than three and not more than five hours daily, on a yearly average, shall be spent in undergoing the latter, and for the en- Practical education insisted upon.

courage ment of such labours, an allowance in part liquidation of expenses may be made; yet, notwithstanding, the course of apprenticeship may be dispensed with, if a satisfactory examination be previously passed in all the operations therein required.

Nature of experiments.

4. Experiments with the different varieties of cereals, grasses and roots, of trees, plants, shrubs, flowers, and fruits; with different modes of cultivation; with different manures; with the breeding, raising and fattening of animals; with the products of the dairy; and with whatsoever else may be of practical benefit in adding to the knowledge of the facts, principles and laws of the science and art of agriculture, horticulture, and arboriculture under the climatic conditions of this Province, shall be carried out on the experimental farm; and the modes of procedure and results published from time to time.

Publication of procedure and results.

Rules, regulations and curriculum of the college.

5. The government of the college shall be under and according to such rules and regulations as the Lieutenant-Governor in Council may from time to time prescribe; and such rules and regulations shall contain provisions for the standard and mode of admission, the course of study, and apprenticeship in each branch in which instruction is given, and may authorize diplomas, certificates of proficiency, scholarship or other rewards to be given, after examination, in any of such subjects; and may also impose reasonable fees for attendance.

Appointments to be made by the Lieutenant-Governor in Council.

6. The Lieutenant-Governor in Council may from time to time appoint a president and such professors, instructors, officers, assistants and servants as the Lieutenant-Governor in Council may deem necessary for the efficient working of said college, and the promotion of its usefulness, and may pass by-laws regulating and prescribing their respective duties.

Sessions, terms and vacations.

7. There shall be two sessions in each year, and two terms in each session; the winter session shall open on the first day of October, and close on the thirty-first day of March; the summer session shall open on the sixteenth day of April, and close on the thirty-first day of August; and the time between the closing and opening of the respective sessions shall constitute the regular vacations.

Affiliation of the college with the University of Toronto.

8. The Lieutenant-Governor in Council may agree with the University of Toronto for the affiliation of the said college with the said university, but only to the extent of enabling the students of the said college to obtain at the examinations of the said university such rewards, honours, standing, scholarships, diplomas and degrees in agriculture as the said university, under its statutes and the Acts of the Legislature in that behalf, may be allowed to confer.

Museum and laboratory.

9. In connection with the college there shall be a museum of agriculture and horticulture, together with the scientific and technical branches relating thereto, in order to afford aids to practical instruction, and illustrations of the agricultural and horticultural products of the Province; as well as a botanical and chemical laboratory to which vendors of seeds and artificial manures may send such seeds and manures, in order that after the proper inspection and tests their purity and strength may be reported for the benefit and protection of the agricultural community.

Gifts, bequests, etc., to college, museum or laboratory.

10. It shall be lawful for the Lieutenant-Governor in Council on behalf of the Province to accept, hold and enjoy any gifts, bequests, or devises of personal or real property or effects which any person may think fit to make for the purposes of the said college, museum or laboratory.

11. The Lieutenant-Governor in Council may make such regulations as may be deemed expedient touching the conduct of the students, and their attendance on public worship in their respective churches or other places of religious worship, and respecting their religious instruction by their respective ministers, according to their respective forms of religious faith, and every facility shall be afforded for such purposes.

No religious test or profession required; but all facilities given for acquiring religious training.

12. Full reports of the progress of the said college and farm shall be annually returned and submitted to the Legislative Assembly, which reports shall, amongst other things, contain:—

Reports and returns to the Legislative Assembly.

(1) A tabular statement with the name and residence of each student attending in each session of the year, together with the name, residence and occupation of the parent or guardian, the number of classes that each student attended, and his progress and efficiency therein;

(2) A return of the professors, instructors and assistants, with a summary of the instruction given by each;

(3) A copy of the examination papers used in the sessional examinations, and the results thereof;

(4) A summary of the operations in the various departments of the farm;

(5) A clear and succinct account of the modes of procedure and results of the various experiments carried on during the year;

(6) A detailed statement of the income and expenditure of the college and farm for the year;

(7) A copy of all rules and regulations made during the year by the Lieutenant-Governor in Council, regarding the standard and mode of admission, the course of study and the course of apprenticeship;

(8) A comparative statement showing the progress of the college and farm from year to year.

APPENDIX 8.

CIRCULAR OF THE ONTARIO AGRICULTURAL COLLEGE AND EXPERIMENTAL FARM FOR 1882.

Staff.

(*a*) *College.*

1. James Mills, M.A., President, *Professor of English Literature and Political Economy.*
2. William Brown, C.E., P.L.S., *Professor of Agriculture.*
3. R. B. Hare, B.A., Ph.D., *Professor of Chemistry, and Lecturer on Geology and Meteorology.*
4. J. P. Playfair McMurrich, M.A., *Professor of Biology and Horticulture, and Lecturer on English.*
5. F. Grenside, V.S., *Professor of Veterinary Science.*
6. William Nattress, M.B., First Class A. Provincial Certificate, *Professor of Mathematics and Assistant Resident Master.*

A. T. Deacon, *Bursar.*

(*b*) *Farm.*

1. William Brown, C.E., P.L.S., *Farm Superintendent.*
2. P. J. Woods, *Farm Foreman.*
3. James Forsyth, *Foreman of the Horticultural Department.*
4. James McIntosh, *Foreman of the Mechanical Department.*

Introduction.

The Institution, known as the "Ontario Agricultural College and Experimental Farm," is situated about a mile to the South of the City of Guelph, in the centre of an extensive agricultural and noted stock-raising district, readily accessible by rail from all parts of the Province. The Farm consists of 550 acres, about 400 of which are cleared. It is composed of almost every variety of soil, and hence is well suited for the purposes for which it was selected.

Immediately upon taking possession, the Government appointed a commission to enquire and report regarding "the manner of adapting the said farm and management and control thereof to the purpose of a Model and Experimental Farm." A few extracts from the Report of this Provincial Farm Commission will show clearly the basis upon which the Institution is at present established.

"The objects of the Institution should be—First, to give a thorough mastery to the practice and theory of husbandry to young men of the Province engaged in Agricultural or Horticultural pursuits, or intending to engage in such; and, second, to conduct experiments tending to the solution of questions of material interest to the Agriculturalists of the Province, and publish the results from time to time.

"That the Farm should be separated into five distinct departments, namely :—

"1. Field Department.
"2. Horticultural Department.
"3. Live Stock Department.
"4. Poultry, Bird and Bee Department.
"5. Mechanical Department.

"All permanent improvements on the Farm should be carried out on a gradually developed system, and in such a manner as to exhibit and test the comparative values of the most approved methods of executing the several works; and to test the cost, convenience and durability of the several appliances from time to time recommended for adoption on the farms of the Province."

In order to carry out the suggestions of the Provincial Farm Commission, the Government made such improvements on the residence found on the place as would best utilize it for present purposes. Accommodation was provided for about twenty-five pupils, a Principal and a Rector were appointed, and a Foreman for each of the following departments engaged, viz. :—

1. Farm Department.
2. Live Stock Department.
3. Horticultural Department.
4. Mechanical Department.

Work commenced on a small scale in May, 1874; but, owing to a variety of causes, very little was accomplished the first year and a half. The country was scarcely prepared for such an institution; and some of the first appointments were unfortunate. Hence, for two or three years, it seemed very doubtful whether the College would survive the attacks of its enemies and the mistakes of its friends. At length, however, common sense prevailed, and success was assured.

The College buildings have been altered and enlarged from time to time till they assumed the proportions indicated in the frontispiece of this Report; and many improvements have been made on the Farm. A considerable portion of it has been under-drained, suitable buildings have been provided, and a fair representation of stock secured—seven breeds of cattle, six of sheep, and three of pigs.

TERMS OF ADMISSION.

1. Each candidate must be at least sixteen years of age.

2. He must produce satisfactory certificates—

   (1) As to moral character.
   (2) As to physical health and strength.
   (3) As to the assent of his parents or guardians.
   (4) As to his intention to follow Agriculture or Horticulture as an occupation.

3. He must pass the matriculation examination.

4. If a ratepayer or a *bona fide* resident of the Province of Ontario, he must pay a fee of $25 a year in advance; if not, he must pay a fee of $50 a year in advance.

5. At the commencement of each term, except the Summer Term, he must deposit, in addition to the fee, a certain sum to be applied on his board account for one term in advance—

At the commencement of the Fall Term (1st Oct.)	$20 00
" " " " Winter Term (5th Jan.) ..	20 00
" " " " Spring Term (16th April)..	15 00

At the end of each term, the unexpended balance of the amount deposited for that term, if any, will be refunded to the student or his guardian. The amount to be refunded will, in each case, depend on how *well* and how *regularly* the student works in the outside departments.

MATRICULATION EXAMINATION, CERTIFICATES, ETC.

The subjects for Matriculation are as follows :—

(*a*) Reading, writing and dictation.
(*b*) English Grammar—Parsing and Analysis.
(*c*) Arithmetic—to the end of Simple Proportion.
(*d*) The outlines of General Geography, and the Geography of Canada.

Candidates for admission are required to present themselves for examination on the 17th of April or the 1st of October, at nine a.m. in the Lecture Room of the College.

First, Second and Third Class Teachers; holders of Intermediate Certificates, or Certificates of entrance into the High Schools or Collegiate Institutes of Ontario; Graduates or Undergraduates of any University in Her Majesty's dominions, will be admitted on presentation of certificates or diplomas. Intending students who do not hold any such certificates or diplomas, are advised to pass the examination for admission to some Ontario High School, to save the expense and annoyance of having to return home in case of their failing to pass our Matriculation Examination.

☞ There are no special examinations for those who come late. If candidates present themselves after the regular Matriculation Examinations are over, on the *1st October* and the *16th April*, they cannot be admitted without certificates.

GENERAL RULES.

1.—Students are Required

1. To render cheerful and willing obedience to orders.
2. To conduct themselves in a gentlemanly and orderly manner at all times.
3. To avoid all noisy or boisterous conduct in or about the building.
4. To observe neatness of dress at prayers, meals and lectures, and tidiness in their rooms.

2.—The following Practices are Absolutely Forbidden:—

1. Swearing, improper language, and gambling.
2. Use of intoxicating liquors, cards, or firearms.
3. Use of Tobacco while on detail, in or about the buildings, or in any place except in the smoking room.
4. Entering domestic or private apartments without permission.
5. Absence without leave.
6. Cutting, marking, or in any way defacing the College buildings or furniture.

GENERAL REGULATIONS.

1. All students who reside in the building are under the charge of the President.
2. A register is kept of the attendance of students at prayers, work and lectures.
3. All students must attend prayers regularly, unless exempted from doing so, in consequence of objections raised by their parents or guardians.
4. They are required to attend their respective places of worship every Sabbath forenoon.
5. No student is allowed to leave the Institution during the hours of duty without the permission of the President; nor after seven o'clock in the evening, without the permission of the President or the master in charge *pro tem.*
6. In order that there may be no interference with the regular duties of the Institution, the half of every Saturday is set apart as a holiday for recreation and private business.
7. Students must not invite friends or guests to the dining-hall, or to stay over night in the College, without first obtaining the consent of the President.
8. None but the regular boarders are, under any circumstances, to remain over night in the College without leave from the President.
9. Students are provided with everything in the shape of furniture, bedding, towels, etc., that may be requisite, but each is accountable for every such article placed at his disposal.
10. Every student damaging or breaking anything, is required to report the same, that the value of the repairs may be charged to his account.
11. The morning bell is rung at 6 a.m.; bell for breakfast, at 6:30 a.m.; farm bell, at 7 a.m.; school bell, at 9 a.m.; farm bell, at 12 noon; dinner, at 12:30 p.m.; farm bell,

at 1:30 p.m.; school bell, at 2 p.m.; farm bell, at 5:30 p.m.; school bell, at 7 p.m.; bell for roll-call and evening prayers, at 9 p.m.; lights out at 10 p.m.; doors closed at 10:30 p.m.

12. The President is authorized to make such additional regulations as may seem to him necessary for the discipline of the Institution, and to impose fines and other penalties, for the infraction of rules and regulations.

13. No student whose moral conduct, industrial and intellectual progress is unsatisfactory to the staff, will be allowed to remain at the Institution.

N.B. (1) It is the duty of the President to enforce the above rules and regulations.

(2) A copy of this circular will be sent to every candidate for admission; and an application thereafter will be taken as an agreement on his part to comply with all the above rules, regulations and prohibitions.

(3) In the case of occasional students who are of age and are their own guardians, the President may, if he think proper, relax the rules regarding leave of absence and attendance at church.

RESIDENCE, LABOUR, BOARD, REMUNERATION, ETC.

It is desirable that all students should reside in the building. As, however, the city is distant but a mile and a half, students may board in it and attend lectures.

The number of hours of labour for regular students varies with the season of the year, from three and a half to five hours a day. In the months of July and August, when there are no lectures, the number is nine and a half hours a day.

Board, lodging, and light, with the washing of towels and bed linen, $2.24 to $2.52 a week.

Washing, 30 cents per dozen pieces.

Allowances for labour four to ten cents an hour, according to its value as estimated by the Farm Superintendent and his foremen—in no case to exceed the charges for board and washing.

By this arrangement the cost of education is reduced to a minimum.

(1) The entire cost to an Ontario farmer's son, able and willing, with considerable experience in farm work, is $50 to $70 a year for *board, washing*, and *tuition*.

(2) To an Ontario student without any previous knowledge of farming, $60 to $75 a year for *board, washing*, and *tuition*.

(3) To non-residents, $75 to $100 a year for *board, washing*, and *tuition*.

COURSE OF INSTRUCTION.

The instruction given at the Institution is embraced under two heads: a Course of Study and a Course of Apprenticeship.

I.—COURSE OF STUDY.

The course of study is one or two years, and comprises the following subjects:—

First Year.

SUBJECTS:

Agriculture.
Live Stock.
Inorganic Chemistry.
Organic Chemistry.
Veterinary Anatomy.
Veterinary Materia Medica.
Physiology.
Zoology.
Structural and Physiological Botany.
Geology and Physical Geography.
English Literature.
English Composition.
Book-keeping.
Arithmetic.
Mensuration.

SECOND YEAR.

SUBJECTS.

Agriculture.	Entomology.
Arboriculture.	Meteorology.
Live Stock.	English Literature.
Agricultural Chemistry.	Political Economy.
Veterinary Pathology.	Book Keeping.
Veterinary Surgery and Practice.	Mechanics.
Systematic and Economic Botany.	Levelling and Surveying.

DEPARTMENTS OF INSTRUCTION.

DEPARTMENT 1.—AGRICULTURE.

INTRODUCTION.—*History of Agriculture.*—Ancient mediæval, modern; *Literature*—standard works, reports of societies, periodicals; *Varieties of Farming*,—dairy, stock mixed.

SOILS.—Origin, distribution, physical properties, and classification of soils.

RECLAMATION OF LANDS.—Forest clearing; stumping, stoning, fallowing, etc.

PREPARATION OF THE LAND FOR CROPS.—Ordinary operations of tillage—ploughing, harrowing, cultivating, rolling, subsoiling, levelling; general cultivation most appropriate for the various kinds of soil.

SUCCESSION OF CROPS.—Importance and necessity of rotation; principles thereof; rotations suitable for various soils; crops—root, forage, cereal—treated with reference thereto.

CULTIVATION OF CROPS.—The various crops; *Cereals*—wheat, oats, barley, etc.; *Leguminous*—peas, beans, etc.; *Roots*—turnips, carrots, potatoes, etc.; *Forage or Herbage*—tares, lucerne, clovers, grasses, flax, hemp—cultivation most appropriate for each; *Seeds*—purchasing, testing, preparing, changing; *sowing*—kind and quantity of seed, method of sowing; *after cultivation*, *harvesting*, *consumption*, or preparing for market; cost of production; laying land down to grass; management of grass and pasture land.

IMPROVEMENT OF SOILS AND LAND.—Improvement by thorough ordinary cultivation; subsoiling; *draining*—its value; principles; various methods of draining; cost; *manuring*—farm-yard manuring; application, uses and properties of artificial manures—lime, plaster, salt, bones, superphosphate, nitrate of soda, etc.; green manures.

BREEDING, REARING AND FEEDING OF ANIMALS.—Horses suited for agricultural purposes; various breeds; breeding; feeding and general management; *Cattle*—characteristics of the various breeds—Shorthorns, Herefords, Devons, Ayrshire, etc.; methods of breeding—cross-breeding; in and in breeding; pedigree system; rearing young stock; the fattening process; relation of food to increase; dairy management; butter and cheese management; the factory system; *Sheep*—characteristics of various breeds; long wools, medium wools, short wools; breeding and management of ewe flock; winter and spring feeding; rearing of, lambs; relation of food to increase: wool—texture; quantity and quality; dipping and salving, etc.; *Swine*—characteristics of the various breeds; breeding and management of sows; fattening; relation of food to increase; bacon curing.

IMPLEMENTS OF THE FARM.—Mechanical principles entering into their construction; ploughs, harrows, cultivators; other tillage implements; sowing machines; grass seed and manure distributors; mowing and reaping machines; hay making and harvesting machines; threshing and dressing machines; barn implements; waggons, sleighs, carts; straw cutters; turnip cutters and pulpers; implements used in stock feeding, etc.

GENERAL ECONOMY OF THE FARM.—Laying out a Farm; formation and management of roads and lanes; *fences*—varieties, position, mode of construction, materials, movable fences; hurdles; *hedges*—varities, methods of planting, after cultivation; *buildings*—dwellings, out-buildings, stables, barns, sheds; principles of construction; plans and specifications.

GENERAL BUSINESS OF THE FARM.—Capital necessary—value and price of land, stock, implements and improvements; value of all kinds of labour; making of inventories; keeping of stock and produce registers; *markets*—economical laws regulating them;

customs affecting them; modes of buying and selling; common laws relating to agriculture; relation of agriculture to the other industries.

Arboriculture—Application to the American continent; different kinds of trees; occurrence, habits, uses, values; value of timber as a crop; raising of trees from the seed bed; what part of the country should be planted; planting operations; transplanting large trees; enclosing and draining planted grounds; management of trees with a view to shelter and economy.

Miscellaneous Subjects.

Department 2.—Natural Science.

Chemical Physics—Matter, accessory and essential properties of matter; attraction, various kinds of attraction—cohesion, adhesion, capilliary, electrical and chemical; specific gravity; weights and measures; heat, measurement of heat, thermometers, pyrometers, specific and latent heat; sources, nature and laws of light; spectrum analysis.

Inorganic Chemistry.—Scope of subject; elementary and compound substances; chemical affinity; symbols; nomenclature; combining proportions by weight and by volume; atomic theory; atomicity of the most important elements; oxygen and hydrogen; water—its nature, functions, decomposition and impurities; nitrogen; the atmosphere—its composition, uses and impurities; ammonia—its sources and uses; nitric acid and its connection with plants; carbon; combustion; carbonic acid and its relation to the animal and the vegetable kingdom; sulphur and its compounds; manufacture and uses of sulphuric acid; phosphorus; phosphoric acid and its importance in agriculture; chlorine—its bleaching properties; bromine: iodine; silicon, &c.

Organic Chemistry.—Construction of organic compounds; alcohols, aldehydes, acids and their derivatives; formic, acetic, oxalic, tartaric, citric, lactic, malic, uric, and tannic acids. Constitution of oils and fats—saponification; sugars; starch, cellulose; albuminoids, or flesh formers, and their allies; essential oils, alkaloids—morphine and quinine; classification of organic compounds.

Agricultural Chemistry.—Connection between chemistry and agriculture; the various compounds which enter into the composition of bodies of animals; the chemical changes which food undergoes during digestion; chemical changes which occur during the decomposition of the bodies of animals at death; the functions of animals and plants contrasted; food of plants, and whence derived; origin and nature of soils; causes of unproductiveness in soil, and how detected; composition of different plants in relation to the soils upon which they grow; rotation of crops; preservation, development, and renovation of soils; manures classified; the chemical action of manures on different soils; chemical theories in reference to the action of superphosphates, the action of lime in the decomposition of double silicates; feeding of animals; classification of foods; chemical results in the use of different foods; points necessary to be considered in order to obtain the full value of artificial and natural foods.

Practical and Analytical Chemistry.—Chemical manipulation, preparation of common gases and reagents; operations in analysis—solution, filtration, precipitation, evaporation, distillation, sublimation, ignition, and the use of the blow-pipe; testing of substances by reagents; impurities in water; adulterations in foods and artificial manures; injurious substances in soils.

Quantitative analysis of soils, manures, and farm produce.

Geology.—Connection between geology and agriculture; classification of rocks—their origin and mode of formation, changes which they have undergone after deposition fossils—their origin, inferences from their presence in rocks; geological periods and the characteristics of each. Geology of Canada, with special reference to the nature and economic value of the rock deposits; glacial period and its influence in the formation soil. Lectures illustrated by numerous diagrams and specimens.

Physical Geography.—Scope of the subject—earth's place in space, external and internal conditions, atmosphere, ocean, land; superficial configuration of Ontario; theory of springs; classification of lakes; zones of animal and vegetable life.

Meteorology.—Relation of meteorology to agriculture; composition and movements of the atmosphere; nature and manipulation of the barometer, its importance in forecast-

ing the weather ; temperature, description of the various instruments used in its measurement and how to use them ; solar and terrestrial radiation ; the influence of forests on climate ; mists, fogs, clouds, rain, hail, and snow ; description of instruments used in measuring rain and snow-fall ; velocity and direction of wind, causes affecting climate ; influence of climate on vegetation.

Structural and Physiological Botany.—Internal structure of plants—cells and vessels ; structure and development of the external parts of plants—root, stem, leaf, flower, seed, fruit ; physiology of the cells and vessels—chlorophyll, starch, gum, sugar, crystals, etc.; movements of fluids in plants, respiration, nutrition, reproduction ; hybridization ; modes of propagation of *varieties* by grafting, budding, layering, and division ; disease of plants—smut, rust, mildew, etc.

Systematic and Economic Botany.—Subject defined ; principles considered in the classification of plants—plants classified ; orders containing the plants of greatest importance to the agriculturist described ; plants classified in regard to their economic value for food, medicine, fabrics, forage, timber, etc. The course illustrated by a large collection of well preserved plants.

Zoology.—Nature of live ; vital force ; difference between animals and plants ; morphology and physiology ; homology and analogy ; definition of species ; classification ; subdivisions of the animal kingdom ; character of the classes and most important orders, etc.

Entomology.—Anatomy of insects ; geographical distribution and classification of insects ; metamorphoses of insects ; insects injurious to vegetation, their habits and the best methods of checking and preventing their ravages—all illustrated by a good collection of specimens.

Department 3—Veterinary Science.

Anatomy and Physiology of the Domestic Animals.—Horse, ox, sheep, pig. Osseous system, muscular system, syndesmology, planetar system, odontology, digestive system, circulatory system, respiratory system, urinary system, nervous system, sensitive system, generative system, tegumental system.

Veterinary Pathology.—Osseous system—the nature, causes, symptoms, and treatment of the various diseases of bone, as splint, spavin, ringbone, etc.

Muscular System—Nature, causes, symptoms, and treatment of flesh wounds, etc.

Syndesmology—Nature, causes, symptoms, and treatment of bog spavin, curb, and other diseases of joints.

Plantar System—Nature, causes, symptoms, and treatment of corns, sand crack, and other diseases of the foot.

Odontology—Describing the diseases of the teeth ; also the mode of determining the age of animals by the same.

Digestive System—Nature, causes, symptoms, and treatment of spasmodic and flatulent colic, inflammation of the bowels, acute indigestion, tympanitis in cattle, impaction of the rumen, and many other common diseases.

Circulatory System—Describing the diseases of the heart and blood vessels.

Respiratory System—Nature, causes, symptoms, and treatment of catarrh, nasal gleet, roaring, bronchitis, pleurisy, inflammation of the lungs, etc.

Urinal System—Nature, causes, symptoms, and treatment of inflammation of the kidneys, etc.

Nervous System—Nature, causes, symptoms, and treatment of lock-jaw, string-halt, etc.

Sensitive System—Nature, causes, symptoms, and treatment of the diseases of the eye and ear,

Generative System—Nature, causes, symptoms, and treatment of abortion, parturition, milk fever, etc.

Tegumental System—Nature, causes, symptoms, and treatment of scratches, sallenders, mallenders, parasites, and other diseases of the skin.

Materia Medica.—The preparation, actions, uses, doses, of over one hundred of the principal medicines used in Veterinary practice.

Department 4—English and Political Economy.

English.—History of the English language; its formation and connection with other languages. The sentence, the paragraph and the period; capitals and punctuation; style—its varieties and qualities; the principal figures of speech defined and illustrated; accuracy, purity, propriety, clearness, precision, strength, and grace; false syntax discussed and corrected; prose and poetic diction distinguished; standard and characteristics of taste; pleasures of the imagination, etc.

Frequent exercises in letter-writing and impromptu composition.

Committing to memory and critical study of two of Shakespeare's plays, and of selections from Milton, Gray, Goldsmith, Cowper, and Scott.

Political Economy.—Utility; production of wealth; land, labour, capital; division of labour; distribution of wealth; wages; trades unions; co-operation; money; credit; credit cycles; functions of government; taxation; etc.

Department 5—Mathematics and Book-keeping.

Arithmetic.—Review of subject with special reference to farm accounts; tables of weights and measures; interest, discount, stocks, and partnership; equation of payments; alligation; exchange, etc.; mental arithmetic—calculation in simple rules, fractions, and compounds rules.

Mensuration.—Mensuration of surfaces and solids, with special reference to the measurement of lumber, timber, earth, etc.

Statics.—Forces; the mechanical powers; friction; the steam-engine; strength of materials; units of work; etc.

Dynamics.—Motion, forces producing motion, momentum, etc.

Hydraulics.—Transmission of pressure; the hydraulic press; specific gravity, density; pumps, siphons, etc.

Levelling and Surveying.—Fields surveyed with chain and cross-staff; heights and distances found by the theodolite.

Drainage.—General principles; discharging water-ways; how, where, and when to commence draining; depth of drains and distance apart; furrow drains; drains followed by other improvements; drainage implements; levelling.

Road-making.

Book-keeping.—Business forms and correspondence; general farm accounts; dairy, field, and garden accounts; laws relating to farming—deeds, mortgages, notes, etc.

II.—COURSE OF APPRENTICESHIP.

The students are daily distributed to each of the following departments:—

1. The Live Stock Department.
2. The Field Department.
3. The Horticultural Department.
4. The Mechanical Department.
5. The Experimental Department.

They are taught the manner of performing the various operations in each department by the instructor or his assistants in that department; and, being sent in rotation to each, it is expected that at the end of two years a thorough apprenticeship will have been served.

The instruction received in the class-room is, as far as possible, illustrated and exemplified in the fields, yards, and shops. The following may be taken as a few of the operations, in the performance of which apprenticeship is served:—

Field Department.—Cleaning, harnessing, and management of horses, ploughing, harrowing, cultivating, drilling, sub-soiling; sowing broadcast and by drill; planting, hoeing, and grubbing; haying by scythe and mower; harvesting; threshing, winnowing, stoning, draining, levelling, measuring, stumping, etc.

Live Stock Department.—Cutting, pulping, steaming, mixing, feeding, cleaning, general management of cattle feeding, lambing, shearing, castration, dipping, salving, hurdling ; general management of sheep feeding, and general management of other stock.

Horticultural Department.—Digging, ploughing, raking, seeding, planting, hoeing, mowing, harvesting, storing; general management of vegetables, flowers, and lawn. Pruning, grafting, budding, mulching ; general management of an orchard. General management of propagating houses, green-houses, vinery, nursery, hedges, walks and roads, etc., etc.

Mechanical Department.—Planing, sawing, nailing, grooving, matching, morticing, framing, and general use of commoner mechanical tools. Fencing, hurdle making, gate making, and general farm improvements. Repairs of all farm buildings, implements, machines, etc., etc.

TERMS, SESSIONS, VACATIONS, AND EXAMINATIONS.

Terms and Sessions.—The scholastic year commences on the 1st of October, and ends on the 31st of August. It is divided into two sessions, and each session into two terms, as follows :—

Fall Term—1st Oct. to 22nd Dec.	*Winter Session.*
Winter Term—5th Jan. to 31st Mar.	
Spring Term—16th April to 30th June.	*Summer Session.*
Summer Term—1st July to 31st Aug.	

Lectures commence on the 1st October, and continue throughout the first three terms—from 1st of October to 30th of June. During that time all regular students have class-room work, and manual labour alternately—three hours a day being spent at the former, and from three and a half to five at the latter. To this are added five hours in two weeks for set-up drill and gymnastics, so that the daily routine of every student in the regular course, for nine months of the year, is—

Lectures in the College.—Three hours a day (excepting Saturdays).
Manual Labour Outside.—Three and a half to five hours a day.
Study in Rooms.—Two hours a day.
Drill and Gymnastics.—One hour a day (for five days of every alternate week).

While the first year students are at lectures in the College, the second year students are employed outside. Those who go out to work in the forenoon, come in for lectures in the afternoon, and *vice versa*. Thus the theoretical work inside and the practical work outside go on simultaneously during the Fall, Winter and Spring Terms. The Summer Term (1st July to 31st August), is devoted entirely to work in the outside departments—the farm, the live stock, the garden, the carpenter shop, and experiments.

Vacations.—There are three vacations in the year—the Christmas vacation (22nd December to 5th January), the Easter vacation (1st to 16th April), and the Summer vacation (1st to 30th Sept.) The College boarding-house is closed during the vacations.

Examinations.—The examinations which every student is required to pass each year of the course, are also three in number—one in December, on the work of the Fall Term; one at the end of March, on the work of the fall and Winter Terms ; and one at the end of June, on the work of the Spring Term. The last two embrace not only the class-room work, but also the handling and judging of live stock, and the various operations in the outside departments.

DIPLOMAS.

A diploma is given to each student who completes his course of study, and passes satisfactorily all examinations, both on the subjects contained in the curriculum, and on the work of his apprenticeship.

MEDALS.

Three medals are offered for competition among the students of the second year, designated—

The Gold Medal,
The First Silver Medal,
The Second Silver Medal.

All second year students are eligible to compete for these medals, provided they continue regularly from the beginning to the end of the course, without dropping out or missing any of the prescribed examinations.

In case of failures in first year Examinations, or in the Christmas Examinations of the second year, the President may grant Supplemental Examinations or entertain claims for an *ægrotat*, without interfering with the right to compete.

The competition is—

(1.) By written examinations at Easter on the class-room work of the Fall and Winter Terms.

(2.) By written examinations at the end of June on the class-room work of the Spring Term.

(3.) By practical examinations at the above dates on cattle, sheep, pigs, horses, and the various operations taught or performed on the farm, in the garden, or in the carpenter shop.

The minimum standard for the gold medal is 50 per cent. of the marks in each subject, and an aggregate of 75 per cent. of the total number of marks in all the subjects; for the silver medals, 50 per cent. in each subject, and an aggregate of 67 per cent. in all the subjects.

GENERAL REMARKS.

A few general remarks on the appliances and advantages possessed by the institution for training young men for agricultural pursuits, may be given in conclusion.

Farm and Carpenter Shop.

The carpenter shop is provided with three or four benches, and the tools necessary for plain work and general repairs.

The farm is being gradually laid out, cleaned, and drained. The best and most approved farm implements and machinery are used. Seven breeds of cattle, six of sheep, and three of pigs are kept for the purposes of instruction. The monthly fairs and fat cattle shows in the city of Guelph, are occasionally visited and reported on by the students.

Experiments.

A portion of the farm has been laid out in small plots; and a series of experiments with cereals, roots, grasses, manures, and various modes of management is regularly and systematically carried on from year to year. Besides the field experiments, others in the feeding of live stock are made during the winter, to test the several breeds of animals and the comparative values of different kinds of feed.

Horticultural Department.

In this department there are three green-houses, a four acre kitchen garden, a vinery, a thirty acre lawn, an arboretum, and a large variety of fruit and ornamental trees.

Veterinary Department.

The veterinary department has been fully organized and is doing good work. A complete skeleton of a horse and all the principal bones of ordinary farm animals have

been provided for the class-room. When an animal dies from disease or any other ailment, it is dissected, the cause or causes of death sought for and pointed out in presence of the classes. Thus the work is made as practical as possible.

Library, Reading-room, and Gymnasium.

The Library contains over 4,000 volumes of choice reading on the different subjects embraced in the course of study, and a good selection of history, poetry, biography, and travel; the Reading-room is furnished with thirty-five or forty of the leading papers and periodicals; and the Gymnasium is provided with a horizontal bar, parallel bars, Indian clubs, dumb-bells, bar-bells, and most of the other articles used in common gymnastic exercises.

Advantages of the Course.

Besides becoming fairly skilled in the work of a farm, the student takes part in the cultivation of a garden, and thus increases his knowledge and improves his taste in a very important direction. He also acquires skill in the use of tools, so that he is not only able afterwards to make his own repairs, but knows when such work is properly done. He sees for himself the effects of various rotations and different modes of cultivation, and becomes acquainted on the experimental ground, and in the class-room, with many varieties of grasses, grains, roots and manures. The different breeds of cattle, sheep and swine, of common use in Canada, become familiar to him from daily contact with them; and the excellencies and defects of each he learns by lectures in the class-room, and by reference in the yards. He is taught how to keep live stock registers, accounts of field cropping, and regular farm accounts. He becomes acquainted with the prices of stock, implements, produce, building and improvements, and is prepared to transact the *business* of a farm. He obtains in the Veterinary Department a knowledge of the structure and functions of farm animals, and the most approved methods of treating and preventing the ordinary diseases to which such animals are liable. The study of the relations of the plant, the soil, and the animal to each other, and to his profession, under the heads of Botany, Chemistry, etc., not only shows him the reasons for the rules of the best farm practice, and enables him afterwards to discover other such rules, but likewise forms in him habits of reasoning closely, systematically and correctly, which cannot fail in after life to make him a better citizen. And, lastly, by this, as well as by the teaching in the class-room, by reading standard works in the library, and newspapers and periodicals in the reading-room, by contact with his fellow students, and by discussions carried on with them in their Literary Society, his mind is sharpened and strengthened, his views widened, and his power of thinking, and his ability to express his thoughts greatly increased. If the student be careless, thoughtless, or lazy, few of those advantages will be reaped; but if he be attentive, energetic and diligent the majority of them will be secured.

James Mills,
President.

PART II.

REPORT

OF THE

PROFESSOR OF CHEMISTRY.

ONTARIO AGRICULTURAL COLLEGE,
GUELPH, *December 16th, 1882.*

To the President of Ontario Agricultural College:

DEAR SIR,—As my official connection with the College began about four weeks before the time of holding the Easter examinations, my duties for the Winter Term consisted chiefly in finishing, by a few closing lectures, outlying portions of the work which my predecessor Professor Panton, before his departure for Winnipeg, had not been able to complete. It was with the beginning of the Spring Term that my full work in the department commenced. One of the subjects for the term was Practical and Analytical Chemistry.

The size of the College Laboratory is significantly given by Professor Panton in last year's Report. It is called "the private room of the Professor of Veterinary Science," capable of accommodating not more than six students at work. As it was impossible for the Professor to accommodate a class of forty or fifty students in a room of that size, "the nearest approach to giving them instruction" in practical chemistry was made "by performing the manipulations while the students looked on."

The unsatisfactoriness of this course the Professor frankly admits. "On asking a student to perform some practical work he was at a complete loss how to proceed, although the work had been done before the class on several occasions." After the confession of this unpleasant experience, Professor Panton very appropriately remarks, "Hands as well as eyes must be used in the operations of chemistry."

To overcome this difficulty, Professor Panton advised the building of a laboratory "capable of accommodating forty or fifty students at practical work," and provided "with a lecture-room, an apparatus-room, a workroom, general storeroom, and a private room, besides the room for practical work." This real want of the chemical department before my time, still exists, though in a somewhat limited sense.

At the beginning of the Spring Term, the class of Second Year students requiring instruction in analytical Chemistry numbered about forty. One of two methods had to be adopted; the old and unsatisfactory one of the Professor performing the operations of chemical analysis while the students looked on, or the satisfactory one of the students performing them while the Professor looked on. We decided to adopt the latter course if a room at all suitable could be found. In company with you, Sir, the cellars of the College

were visited, and pronounced too damp and dark. Your readiness to meet the practical demands of every department of educational work under your charge, led you, we think wisely, to allow us the use of the Gymnasium or old Dining Hall as a room for practical work. You know the result. In a couple of days the students had constructed two long and convenient working tables, furnished with appropriate shelves for holding the necessary re-agent bottles, etc. Six complete sets of re-agent bottles were now mounted upon the shelves, alcohol and spirit lamps were exchanged for gas and Bunsen burners, and the work in Analytical Chemistry began.

Analytical tables were printed, and given to the students. The first table exhibited the separation of the metals into groups by the group-reagents, also the separation and identification of the metals of the First Group. The other tables illustrated the separation and identification of the metals of the Second, Third, Fourth, and Fifth Groups. Dr. Douglas and Prescott's work on "Qualitative Chemical Analysis," and Professor Caldwell's work on "Agricultural Qualitative and Quantitative Chemical Analysis," rendered us valuable service in our work.

We give the first of the printed tables a place in our report. We do this that the friends of the College may have an idea of the character of the practical work done by the students.

GROUPING OF METALS.

(Remove each group before testing for the next.)

I. Add HYDROCHLORIC ACID, a drop at a time, as long as a precipitate is produced : warm, agitate, and filter.

PRECIPITATE :

GROUP I.

Lead, $PbCl_2$, *white.*
Silver, $AgCl$, *white.*
Mercurosum, Hg_2Cl_2, *white.*

II. To the Filtrate, or, if Group I. is absent, to the original solution + HCl, add H_2S in excess ; warm and filter. (Free mineral acid must be sufficient for the formation of As_2S_3 and not to strong for complete precipitation of Sb_2S_3. If original solution is strongly acid—as after solution of dry substances by mineral acids—the excess of acid must be reduced by evaporation. Free chlorine must be fully expelled.

PRECIPITATE :

GROUP II.

Asenic, As_2S_2, *yellow.*
Antimony, Sb_2S_3 or Sb_2S_5, *orange.*
Tin, SnS, *brown.*
SnS_2, *yellow.*
Gold, Au_2S_3, *black.*
Changing in boiling to— Au_2S, *brown.*
Platinum, PtS or PtS_2, *black.*
Lead, PbS, *black.*
Bismuth, Bi_2S_3, *black.*
Copper, CuS, *black.*
Cadmium, CdS, *yellow.*
Mercury, HgS, *black.*

(First, white to yellow.)

III. To the clear filtrate from Group II., in which H_2S will cause no precipitate (Phosphates, Oxalates, etc., being absent), and freed from H_2S by boiling, add a few drops of Nitric Acid and boil an instant to oxidize ferrosum. Immediately add NH_4Cl and excess of NH_4OH.

PRECIPITATE : GROUP III.—A.

Aluminium, $Al_2(OH)_6$, *white, gelatinous.*
Chromium, $Cr(OH)_6$, *bluish-green*
Ferricum, $Fe_2(OH_6)$, *reddish-brown.*

Filter and wash: To filtrate add $(NH_4)_2S$ and warm until precipitate subsides. Filter and wash.

PRECIPITATE : GROUP III.—B.

Maganese, MnS, *flesh-coloured.*
Cobalt, CoS, *black.*
Nickel, NiS, *black.*
Zinc, ZnS, *white.*

The entire Group III. is precipitated by Ammonium Sulphide, Chloride, and Hydrate, the same as above, except iron, FeS, *black.*

IN PRESENCE OF PHOSPHATES.

By Ammonium Sulphide, etc., etc.
All as above (iron as FeS) and Ba, Sr, Ca, Mg, Al, Cr, as Phosphates, *white.*

IV. *To the Filtrate from Group III.*, containing NH_4Cl, add $(NH_4)_2CO_3$ and NH_4OH ; digest with gentle heat (not boiling) for some time, and filter.

PRECIPITATE :

GROUP IV.

Barium, $BaCO_3$, *white.*
Strontium, $SrCO_3$, *white.*
Calcium, $CaCO_3$, *white.*

V. *The Filtrate contains :*

GROUP V.

Magnesium Salts.

Ammonium Salts.
Potassium "
Sodium "
Lithium "

The Precipitate is washed on the Filter with one or two small portions of cold water ; then treated with much HOT WATER, and filtered.

SOLUTION : $PbCl_2$.

Test for Lead by —

1. SULPHURIC ACID, giving $PbSO_4$, *white.*

   Not chemically changed or permanently dissolved by acids, yet slightly soluble in strong acids—Soluble in boiling $NH_4C_2H_3O_2$ and in the fixed alkalies. Soluble in warm Sodium Thiosulphate $Na_2S_2O_3$, solution at Temp. not above 68° C; (154° F.) ; in hot solution, lead sulphite is formed, insoluble in thiosulphate ; distinction and separation from Barium Sulphate, which does not dissolve in thiosulphates.

2. SULPHURETTED HYDROGEN, PbS, *black*—

   Insoluble in dilute acids, alkalies, or alkali sulphides. Moderately dilute (15 to 25 per cent.) nitric acid dissolves the precipitate with separation of sulphur:

   $3PbS + 8HNO_3 = 3Pb(NO_3)_2 + 3S + 2NO + 4H_2O$.

   Concentrated nitric acid changes it mostly to the insoluble lead sulphate :

   $3PS + 8HNO_3 = 3PbSO_4 + 8NO + 4H_2O$. In solutions excessively dilute with this re-agent, only a brown colouration occurs without precipitation, revealing lead in solutions 100,000 parts of water.

3. CHROMATE, $PbCrO_4$, *yellow*—

   Soluble in fixed alkali hydrates (distinction from Bismuth), insoluble in chromic acid (distinction from barium), decomposed by HCl and by NH_4OH.

4. IODIDES, PbI_2, *bright yellow and crystalline*—

   Soluble in 1,900 parts of cold or 200 of hot water — soluble in hot moderately concentrated HNO_3, and in solutions of fixed alkalics, not in cold HCl.

The precipitates may be tested by the blow-pipe.

On charcoal alone, or more readily with Na_2CO_3, the lead is reduced to malleable globules. An incrustation of lead oxide forms around the mass—dark-yellow when hot, sulphur-yellow when cold, driven by the reducing flame, but non-volatile without reduction. The presence of this incrustation, in the reducing flame, imparts a blue colour to the outer flame.

REMAINING PRECIPITATE : AgCl, Hg_2Cl_2. Digest with dilute, warm NH_4OH, and filter.

SOLUTION : $(NH_3)_3(AgCl)_2$.

Test for silver, after expelling any excess of ammonia by boiling, by acidulating slightly with *nitric acid.* A precipitate is AgCl. The recently precipitated silver chloride, acidulated with HCl or H_2SO_4, is reduced to the metal on introducing a piece of ZINC without agitation—the advancing boundary of dark-brown colour in the mass—evidencing the progress of the reduction.

On Charcoal, with Na_2CO_3, silver is reduced from its compounds in the blow-pipe flame, attested by a bright malleable globule. Dissolve the metallic globule by HNO_3 and test the resulting solution :

1. By HCl—precipitate, AgCl, *white curdy.*
2. By fixed alkalies, Ag_2O, *grayish-brown.*
3. By H_2S from neutral, acid or alkaline solutions, Ag_2S, *black.*
4. By HNa_2PO_4, *from neutral solutions,* Ag_3PO_4, *yellow.*
5. By Na_3AsO_3, *from neutral solutions,* Ag_3AsO_3, *yellow.*
6. By Na_3AsO_4, *from neutral solutions,* Ag_3AsO_4, *red-brown.*
7. By K_2CrO_4—Ag_2CrO_4, *dull red.*
8. *A bright strip of copper*, introduced into a solution of SILVER NITRATE, receives a lustrous silver coating.
9. *A globule of mercury*, placed in a concentrated solution of SILVER NITRATE on a watch glass, becomes covered with a deposit of silver *amalgam* in arborescent form—the silver tree, *Arbor Dianæ.*

RESIDUE : NH_2Hg_2Cl, *black.*

If the lead chlorid is not all washed out with hot water, the NH_4OH will change it to insoluble *white* lead oxychloride, Pb_2OCl_2, and leave it with the mercury on the filter.

1. The black colour of the residue is the evidence of mercury.
2. Dry a portion of the residue, and heat it with Na_2CO_3 in a glass tube. A sublimate of *metallic mercury* condenses as a gray mirror coat on the inner surface of the cool part of the tube. The coating consists of globules, which, when gently rubbed with a glass rod, become visible to the eye.
3. Dissolve the remaining portion of the residue with nitro-hydrochloric acid, as mercuric chloride, $HgCl_2$. Precipitate from this solution :

   1. By NH_4OH——NH_2HgCl, *white.*
   2. By fixed alkalies—short of saturation, reddish-brown *basic salts*—to supersaturation, HgO, *orange-yellow.*
   3. By H_2S—the precipitate is first white, becoming by further additions of reagent, yellow, orange, brown, and finally black. (The lighter coloured prec. $= HgCl_2HgS$). The black HgS is by sublimation and trituration converted to the red (vermilion) without chemical change.
   4. By KI—HgI_2, first reddish-yellow, then red.

Reducing agents (Stannous chloride, boiling solution of sulphurous acid, or thiosulphates) precipitate from solutions of $HgCl_2$, first the white Hg_2Cl_2, then the gray Hg (strong acidulation with HNO_3 interferes with the re-action). By digestion with hot concentrated HCl, and a little solution of $SnCl_2$, the gray precipitate of divided mercury is converted into globules of metallic lustre. Glass-rod by trituration hastens result.

A clean strip of copper *placed* in a slightly acid solution of mercury becomes coated with metallic mercury. The tin-white lustre of the metal is seen by rubbing the coating with cloth or paper—heat drives off the coating. Zinc and iron also reduce mercury, etc., etc.

The analytical re-action of each base and of each acid was first studied; the separation of the metals into groups and of the acids next followed; finally, the student was required to analize unknown mixtures, containing from two to several compounds. Some of the bases and acids were separated with as much care as if their proportion by weight had to be determined. In the performance of this work, the operations of analysis in the *dry way* as well as those in the *wet way*, were used. It was also sought to give the student a clear conception of the nature of Ultimate and Proximate Organic Analysis.

The student was required to formulate every chemical change occurring in the analytical operations he made. By this exercise the *atomicity* and *basicity* of the metals and acids were thoroughly memorized. The student also became able mentally to combine, dissociate, oxidize, reduce, and transpose chemical elements, without the aid of blackboard and chalk. The student was also required to translate chemical equations into statements of proportional parts by weight. This was done that he might acquire correct and clear ideas of the significance of formulæ and equations, and be able to refer all chemical expressions to the facts of quantitative operations. It was also sought to make the student acquainted with the Chemical Relations of Substances. The study of an acid involved the study of its deportment with all the bases. The practical and theoretical character of the examination paper and exercise must convince all that definite results were not only aimed at, but, in a measure, arrived at by the last class in Practical and Analytical Chemistry.

We are in full accord with the view expressed by Professor Panton in last year's Report, in regard to the importance of having another year added to our course in Chemistry. "It can never be expected that a student coming here for the short period of two years can graduate an adept in Chemical Science, when universities thoroughly equipped demand a much more lengthened period." We think that every student should know something of quantitative analysis before graduation. He should be able to describe the physical properties of soils, mechanically to separate and chemically to analyze them. He should further have some experience in the analysis of natural and artificial manures, and of many kinds of farm produce. To do this conveniently he must acquire a knowledge of the operations of Volumetric Analysis.

There is no one to-day who needs a fuller knowledge of chemistry than the able and practical farmer. As he has now, in many instances, to deal with the improvement of worn out lands, it has become highly necessary that he should be able to make an intelligent application of the elements of fertility directly to the soil by means of rich domestic manures and concentrated commercial fertilizers. If he is able to ascertain the percentage composition of a fertilizer, he can, in a simple manner, compare the cost of manure with its real value. Want of knowledge in this important respect, has led many a purchaser to pay more for the number of pounds of nitrogen or phosphoric acid (in 100 pounds of the article he was buying) than he would have to pay for the same number of pounds of nitrogen in the form of sulphate of ammonia from the gas works, or of phosphoric acid in the bone-black of the sugar refineries.

All our students should be able to analyze milk quantitatively. The lactometer-test of the purity of milk brought to the cheese factory or to the city, has frequently injured and humbled the honest, and rewarded and honoured the dishonest, who were shrewd enough to skim the milk before they watered it.

We are no longer able to meet the increased demands of the Chemical Department, with the annual appropriation of one hundred and fifty dollars. One student, doing chemical work in a thoroughly furnished laboratory of Europe, will spend as much in the same time for fees, apparatus, and breakages. The straitness of our position will be understood, when it is remembered that we are expected to illustrate by experiment lectures on Inorganic, Organic, and Agricultural Chemistry, and on Meteorology, and to furnish a class of fifty students with full sets of re-agents, apparatus, etc., for doing practical work. If the laboratory were well furnished, the present appropriation could not, under existing circumstances, keep it efficient. It is very galling to the practical chemist, in the absence of suitable apparatus, to be obliged to indicate on the blackboard facts that lie at the base of many of the physico-chemical theories of to-day. If we had not had a little inventive skill, these breaks in the experimental demonstration would have been more numerous and unpleasant than they were.

Successfully to carry out the proposed scheme of co-operative experimenting upon the experimental field plots, apparatus for the quantitative analysis of soils, manures, and farm produce, should be forthcoming.

To determine accurately the amount of rainfall, and at the same time to collect rain in sufficient quantity to allow of its chemical analysis, and to ascertain the composition of the drainage water from some at least of the experimental field plots, a large rain gauge of 1-1000th of an acre area, and some drain gauges at different depths in the soil, are to be constructed. Professor Brown informs me that these important additions to the Experimental Department will be made next summer. The Chemical Department will have to determine the composition of the rain and drainage waters.

It will interest and instruct our students to know the amount of nitric acid and of ammonia the rain conveys from the atmosphere to an acre of the farm yearly, and also the quantity of soluble material (plant food) drainage waters yearly remove from the soil. From these considerations it must be evident that the increased experimental work of the College, inside and outside, calls loudly for a more liberally furnished and sustained laboratory.

Results of Experiments at Rothamsted, England.

In June of this year "Memoranda of the Origin, Plan, and Results of the Experiments conducted on the Farm and in the Laboratory of Sir John Bennet Lawes, Bart., LL.D., F.R.S., at Rothamsted, Herts," have been published. The Memoranda contain a most interesting and instructive history of the origin, plan, and results of a series of systematic field experiments which Dr. Lawes, assisted by Dr. Gilbert and others, has been conducting with the most important crops of rotation on the same land, without manure, with farm-yard manure, and with a great variety of chemical manures, since 1843. A brief review of these experiments cannot fail, we think, to interest the farmers of Ontario.

Field experiments have been conducted—
On wheat, 39 years in succession.
On wheat, alternated with fallow, 31 years.
On wheat of different descriptions, 15 years.
On beans, alternated with wheat, 28 years.
On beans, 32 years, including one year wheat and five years fallow.
On barley, 31 years in succession.
On oats, 10 years, including one year fallow.
On clover, with fallow on corn crop intervening, 26 years.
On turnips, 28 years, including three years barley.
On sugar-beet, five years.
On mangold-wurzel, seven years.
On potatoes, seven years (in progress).
On rotation, 35 years.
On permanent grass land, 27 years.

Weighed portions of all the experimental crops have been dried at 100°C., and the dry matter determined. The dried mass has then been burnt to ash on platinum sheets in cast-iron muffles, and the quantity of ash determined and recorded. In some of the samples the nitrogen existing as albuminoids, amides, and nitric acid, has been determined. Seven hundred complete ash analyses have been made.

One thousand samples of the soils of the experimental plots to the depth of 9in., 18in., and 27in. have been taken and submitted to partial separation, while portions of the mould have been carefully analyzed.

The nitrogen, as ammonia and nitric acid, in the rain waters, and the quantity and composition of the water percolating through 20in., 40in., and 60in. depth of soil, have been determined. It has also been sought, by a series of smaller drain gauges, to determine the influence of different crops and different manures on the amount and composition of drainage waters.

In the experiments on cattle feeding, the following points have been investigated :—

1. The amount of food, and of its several constituents, consumed in relation to a given live weight of animal within a given time.

2. The amount of food, and its several constituents, consumed to produce a given amount of increase in live weight.

3. The proportion and relative development of the different organs or parts of different animals.

4. The proximate and ultimate composition of the animals in different conditions as to age and fatness, and the probable composition of their increase in live weight during the fattening process.

5. The composition of the solid and liquid excreta (the manure) in relation to the food consumed.

6. The loss or expenditure of constituents by respiration and the cutaneous exhalations—that is, in the sustenance of the living meat—and manure-making machine. Weighed quantities of food, whose composition had been determined by analyses, were fed to oxen, sheep, and pigs for weeks, and even months, at a time; the weights of the animals during the progress of the experiment taken; and the amount of food to produce a given amount of increase of live weight determined.

Complete analyses of the entire carcases of some animals were made.

Experiments were also conducted with oxen, sheep, and pigs to ascertain the composition of the manure in relation to that of the food consumed.

We shall indicate briefly some of the most interesting results of the field experiments on the gowth of permanent meadow grass, wheat, barley, oats, and some leguminous crops.

The experiments with no manure, and with different manures on Permanent Meadow Land gave per acre per annum, weighed as hay, the following results :—

1. Unmanured, continuously, 20 years' average produce, $21\frac{1}{4}$ cwts.

2. 14 tons farm-yard manure, eight years, average produce, $42\frac{7}{8}$ cwts.

3. 14 tons farm-yard manure and 200 lbs. ammonia salts (equal parts sulphate and muriate of ammonia), eight years, average produce, $49\frac{1}{2}$ cwts.

4. $3\frac{1}{2}$ cwts. superphosphate of lime, 20 years, average produce, $22\frac{1}{4}$ cwts.

5. $3\frac{1}{2}$ cwts. superphosphate of lime and 400 lbs. ammonia salts, 20 years, average produce, $32\frac{1}{4}$ cwts.

6. 275 lbs. nitrate of soda, 20 years, average produce, $33\frac{7}{8}$ cwts.

7. 300 lbs. sulph. potass. 100 lbs. sulph. soda, 100 lbs. sulph. mag., $3\frac{1}{2}$ cwts superphos., 600 lbs. ammonia salts, average produce, 20 years, $57\frac{5}{8}$ cwts.

8. Same as No. 7. with 400 lbs. sil. sod. (200 lbs. silicate soda and 200 lbs. silicate lime), 20 years, average produce, $62\frac{1}{2}$ cwts.

By comparing these results it will be seen (1) that the average produce from farm-yard manure doubles that from no manure, (2) that the average produce from superphosphate of lime is about equal to that from no manure, (3) that nitrate of soda and ammonia salts give fair results, (4) that the highest yield is reached when sulphate of potassium, of soda, and of magnesia, superphosphate of lime, ammonia salts, and silicates of soda and of lime are combined, the average produce per acre of hay being in this case one ton more than that from farm-yard manure.

The experiments on the growth of wheat, without manure and with different kinds of manure, gave per acre per annum, in bushels, the following results :—

1. Unmanured, continuously, 30 years, average produce, $13\frac{1}{8}$ bushels; weight per bushel, $57\frac{7}{8}$ lbs.

2. Farm-yard manure (14 tons every year), 30 years, average produce, $33\frac{1}{2}$ bushels; weight per bushel, 60 lbs.

3. $10\frac{1}{2}$ cwts. superphosphate of lime, 30 years, average produce, $16\frac{3}{8}$ bushels; weight per bushel, $58\frac{1}{8}$ lbs.

4. 400 lbs. ammonia salts, 30 years, average produce, $20\frac{1}{2}$ bushels; weight per bushel, $56\frac{7}{8}$ lbs.

5. 400 lbs. ammonia salts, and $3\frac{1}{2}$ cwts. superphosphate, 30 years, average produce, 26 bushels; weight per bushel, $57\frac{3}{8}$ lbs.

6. 400 lbs. ammonia salts, 3½ cwts. superphosphate, and 366½ lbs. sulphate of soda, 30 years, average produce, 31 bushels; weight per bushel, 59 lbs.

7. 200 lbs. sulph. potass., 100 lbs. sulph. soda, 100 lbs. sulph. mag., 3½ cwts. superphosphates, 550 lbs. nitrate of soda, 30 years, average produce, 36½ bushels; weight per bushel, 58½ lbs.

8. 550 lbs. nitrate of soda, 30 years, average produce, 23⅝ bushels; weight per bushel, 56¼ lbs.

The experimental results on wheat greatly resemble those on permanent meadow land. The average produce from farm-yard manure more than doubled that from no manure. Superphosphates, though liberally supplied, gave alone little more than no manure; nitrate of soda little more than ammonia salts. A mixture of ammonia salts and superphosphate yielded more than either taken separately. There are two other results in the tables of Lawes and Gilbert that equal No. 6. Ammonia salts and superphosphates are the same in each case, but sulphate of potash takes the place of sulphate of soda in the one case, and sulphate of magnesia that of sulphate of soda in the other. It would seem from No. 7 that the full effect of one manure is only obtained when a combination of manures is used. The yield in No. 7 is greater than that from farm-yard manure. The weight per bushel of wheat from farm-yard manure is greater than that from any of the artificial manures.

The experiments on barley gave, under the same conditions, per acre per annum the following results :—

1. Unmanured, continuously, 30 years, average produce, 17⅞ bushels; weight per bushel, 52 lbs.

2. 3½ cwts. superphosphate of lime, 30 years, average produce, 23 bushels; weight per bushel, 53¼ lbs.

3. 275 lbs. nitrate of soda, 30 years, average produce, 34⅛ bushels; weight per bushel, 51⅞ lbs.

4. 200 lbs. ammonia salts, 30 years, average produce, 30¾ bushels; weight per bushel, 52⅛ lbs.

5. 275 lbs. nitrate soda, 400 lbs. silicate soda, 200 lbs. sulph. potass., 100 lbs. sulph. soda, 100 lbs. sulph. mag., and 3½ cwts. superphosphate, 30 years, average produce, 47¾ bushels; weight per bushel, 54⅞ lbs.

6. Farm-yard manure (14 tons every year), 30 years, average produce, 49 bushels; weight per bushel, 54¼ lbs.

7. 100 lbs. rape cake, 30 years, average produce, 43¼ bushels; weight per bushel, 53¾ lbs.

We have only given in our review of the experiments on barley the results of the simple manures, and the greatest result obtained from the combination of different manures. In the tables of Lawes and Gilbert, the combination of superphosphate with ammonia salts, nitrate of soda, and rape cake is seen greatly to increase the result. The highest results on the growth of barley were obtained from farm-yard manure.

Oats treated in the same manner as wheat and barley gave per acre per annum :—

1. Unmanured, five years, average produce, 19⅞ bushels; weight per bushel, 33¾ lbs.

2. 400 lbs. ammonia salts, five years, average produce, 47 bushels; weight per bushel, 35⅞ lbs.

3. 550 lbs. nitrate of soda, five years, average produce, 47⅛ bushels; weight per bushel, 35½ lbs.

4. 400 lbs. ammonia salts, 200 lbs. sulphate potass., 100 lbs. sulphate soda, 100 lbs. sulphate magnesia, and 3½ cwts. superphosphate, five years, average produce, 59 bushels; weight per bushel, 37 lbs.

In these experiments ammonia salts and nitrate of soda give about the same results, while with one of them in combination with different manures the highest results were reached.

The results of some of their experiments on the growth of beans are exceedingly interesting. Mineral constituents used as manure (more particularly potass.) increased the produce very much during the early years; ammonia salts produced very little effect, nitrate of soda more marked effects. When we remember that a leguminous crop con-

tains two or more times as much nitrogen as a cereal one grown under similar circumstances as to soil, etc., we cannot understand why ammonia salts, so rich in results with the cereals, should have little or no effect upon the growth of beans. "Leguminous crops grown too frequently on the same land seem to be peculiarly subject to disease, which no conditions of manuring that we have hitherto tried seem to obviate."

In alternating wheat with beans, Lawes and Gilbert obtained the remarkable result, that nearly as much wheat and nearly as much nitrogen were yielded in eight crops of wheat in alternation with the highly nitrogenous beans as in sixteen crops of wheat grown consecutively without manure in another field, and also nearly as much as were obtained in a third field in eight crops alternated with bare fallow.

The experiments with red clover (*trifolium pratense*) on ordinary arable land gave results with potassium and ammonia salts similar to those already indicated for beans. Lawes and Gilbert further found that neither organic matter rich in carbon as well as other constituents, nor ammonia salts, nor nitrate of soda, nor mineral constituents, nor a complex mixture, supplied as manure, availed to restore the clover-yielding capabilities of the land. If these were applied in large quantity and at considerable depths, they found that the result was better than when they were used in only moderate quantities and applied only on the surface. The results of numerous experiments by Lawes and Gilbert seem to exclude the supposition that the primary cause of failure (clover sickness) is either destruction by parasitic plants or insects, injury from excreted matters, or the shade of a corn crop, and to indicate that it must be looked for in exhaustion of the soil. "When the land is what is called 'clover sick,' none of the ordinary manures, whether artificial or natural, can be relied upon to secure a crop." "The only means of insuring a good crop of red clover is to allow some years to elapse before repeating the crop upon the same land."

2. GEOLOGY.

For the very valuable collection of minerals that the Honourable Commissioner of Agriculture has been pleased, at your suggestion, to make to the Geological Section of the Museum, we have many thanks to offer. The act is a timely one. Professor Panton in his endeavours to make his geological lectures as practical as those on chemistry, collected during his three years' stay at the College, at his own expense, a number of characteristic rocks and fossils, and a few of the more important minerals. In the absence of many of the most essential mineral constituents of rocks, the lecturer on Geology found it extremely difficult to instruct the student practically in many parts of the lithological work. For the same reason the student could not easily and clearly understand the process by which rocks were disintegrated and the different soils produced. As rocks have a mineralogical as well as a chemical composition, their study can be made truly interesting and instructive only when minerals and chemical formulæ unite in the illustration of it. There is no department of Geology so full of living interest to-day as Lithology. By the use of the microscope and chemical analysis, it has been found that by the decomposition of rocks, the fertile soils and most of the ore veins and beds have been produced. The crystalline rocks composing the scum of the once molten earth, contain all the metals of the ores, all the indispensable and supplementary constituents of plants, in a finely divided state. The decomposition of the rocks at the surface gives rise to the different soils, that of rocks below the surface to the metallic ore beds.

If it is concluded to add one year to the College course of study, we shall hail with pleasure the enlargement and completion of the Museum, and the establishment of a course in Microscopical Lithology. But even in the absence of an extension in the course of study, the museum building should be completed. Rocks, fossils, and minerals lie about in ungainly heaps in the Museum, owing to the entire absence of suitable cases in which to place them. For the same reason many specimens of rare minerals from the Continent of Europe, which we have wished to see exhibited in the Museum, lie yet in boxes. It would be the height of folly to fit up the Museum in its present unfinished condition with the necessary cases.

3. METEOROLOGY.

Report of Observations taken at the Ontario Agricultural College during 1882.

During the past year no additions have been made to the instruments of the Meteorological Department of our College.

Observations are regularly taken at the hours of 7 a.m., 2 p.m., and 9 p.m. daily, and recorded in a book printed for the purpose. The instruments in use are as follows:—

Anemometer—Recording the direction of the wind and indicating the number of miles travelled.

Barometer—Showing the atmospheric pressure at the time of observation.

Maximum thermometer—Indicating the highest temperature between times of observation.

Minimum thermometer—Indicating the lowest temperature between times of observation.

Hygrometer—With *dry* and *wet* bulb thermometers, for the purpose of showing the condition of the atmosphere with reference to moisture.

Pluviameter—Used in measuring the rainfall.

Thermometer—For observing ordinary temperature.

Besides taking observations from these instruments, the cloudiness of the sky is observed, and general remarks on the weather for the day are recorded in the daily register. Each morning a form, as seen below, is filled out and given for publication to the daily papers in Guelph. At the close of each month a summary of the month's observations is also given for publication. From these monthly summaries the condensed statement of the year's meteorology is made out.

In my course of lectures on Meteorology, the practical method of teaching, so successfully used by my predecessor, is adopted. "The instruments named above are fully described, and the students taught not only how to read them, but also to epitomize the observations taken in such a way as to make them interesting and instructive."

At examinations the same practical method is used.

The "series of experiments for the purpose of ascertaining some facts in reference to the temperature of different soils exposed to similar conditions," promised by Professor Panton in last year's Report, I shall begin in the near future.

Form of Record Published Daily in the Guelph Papers.

WEATHER RECORD.

Ontario Agricultural College.

.....1882.

Normal height of barometer at Guelph (1,100 feet above sea level and 740 above Lake Ontario), 28·86 inches. Average temperature for.....

Barometer ..... { Height.....inches. / Change.....

Hygrometer.....Moisture.....

Anemometer .... { Direction of wind..... / Miles travelled during previous twenty-four hours.....

Minimum temperature during preceding twenty-four hours.....

Maximum " " " " .....

Pluviameter—Rainfall.....inches.

FORM OF MONTHLY SUMMARY.

Meteorology.

A summary of the meteorological observations taken at Ontario Agricultural College during the month of .....

Barometer—
- Highest barometer.
- Lowest "
- Highest mean barometer.
- Lowest " "
- Monthly " "
- Monthly range.

Thermometer—
- Highest thermometer.
- Lowest "
- Highest meam thermometer.
- Lowest " "
- Monthly " "
- Monthly range.

Hygrometer—
- Day of greatest humidity.
- Day of least "
- Mean "

Pluviameter—
- Days rain fell.
- Greatest rainfall.
- Days snow fell.
- Greatest snowfall.
- Total precipitation.

Anemometer—
- Direction of wind.
- Greatest number of miles travelled in twenty-four hours.
- " velocity per hour.
- Mean velocity per month.

Clouds—
- Cloudy days.
- Clear "
- Mean cloudiness for the month.

The following is a summary of the observations taken during the year 1882 :—

January.

Barometer—

Highest barometer	24th, 2 p.m.,	29·476	inches.
Lowest "	26th, 9 p.m.,	28·174	"
Highest mean barometer	24th, ...	29·424	"
Lowest " "	28th, ...	28·426	"
Monthly " "	....	28·874	"
Monthly range	....	1·302	"

Thermometer—

Highest temperature	8th,	48·3°	
Lowest "	24th,	22°	below zero.
Highest mean temperature	26th,	42·25°	
Lowest " "	23rd,	10·5°	below zero.
Monthly " "		20·5°	
Monthly range		70·3°	

Pluviameter—

Days rain fell	4,	1·06 inches.
Greatest rainfall	26th,	0·64 "
Days snow fell	5,	11·5 "
Greatest snowfall	21st,	4·5 "
Total precipitation		2·21 "

Anemometer—

N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.
5	4	15	7	8	12	11	43 times.

Direction of wind..

Greatest number of miles travelled in 24 hours	22nd,	896 miles.
Greatest velocity per hour	22nd, 9 a.m.,	48 "
Mean for the month		14·3 "

Clouds—

Cloudy days	11
Clear days	4
Mean cloudiness for the month	6·7

Remarks—

January has been a month of considerable meteorological interest, characterized by mildness and great extremes in temperature.

The third week is of special interest. On the 23rd extreme cold set in and reached 22° below zero on the morning of the 24th. This is the coldest day on record for 25 years. Immediately the thermometer began to rise, and in 24 hours reached 30° above zero, increasing till followed by heavy rains on the 26th.

On Wednesday (25th) we had comparatively good sleighing, but the rain of Thursday swept it away, and on Friday the wheeling could not have been surpassed. The month has been cloudy, with but few bright clear days. Very little snow has fallen, and sleighing has lasted but a day or two at a time.

The weather on the whole has been very mild and agreeable, in some respects resembling that of the first weeks of winter more than what we expect to see in mid-winter.

February.

Barometer—

Highest barometer	18th, 7 a.m.,	29·488 inches.
Lowest "	28th, 9 p.m.,	28·002 "
Highest mean barometer	18th,	29·307 "
Lowest " "	21st,	28·225 "
Monthly " "		28·706 "
Monthly range		1·486 "

Thermometer—

Highest temperature	13th, 49·5°
Lowest "	18th, 8°
Highest mean temperature	13th, 41·3°
Lowest " "	28th, 13·6°
Monthly " "	27·8°
Monthly range	41·5°

Pluviameter—

Days rain fell	5,	1·37 inches.
Greatest rainfall	16th,	0·7 "
Days snow fell	9,	10·46 "
Greatest snowfall	18th,	3·5 "
Total precipitation		2·41 "

Anemometer—

	N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.	
Direction of wind..	1	7	6	15	12	6	11	18	times.

Greatest number of miles travelled in 24 hours.....21st, 825 miles.
Greatest velocity per hour.....10th, 2 p.m., 45·6 "
Mean for the month..... 14·6 "

Clouds—

Cloudy days 15
Clear days 9
Mean cloudiness for the month..... 2.1

Remarks—

The month began cold. During the first week snow fell to the depth of two inches on the 2nd, followed by cold up to the 6th. Rain fell on the 7th, followed by cold up to the 11th, when 23° of frost were registered. The days were mild and beautiful from the 12th to the 18th, during which time 35 inches of rain fell. From the 19th to the 25th the weather was very unsettled, being mild and raining and snowing alternately.

The month on the whole was cloudy and much milder than January.

March.

Barometer—

Highest barometer ..... 8th, 7 a.m., 29·438 inches.
Lowest ..... 27th, 2 p.m., 28·048 "
Highest mean barometer..... 8th, ... 29·343 "
Lowest " " ..... 28th, ... 28·235 "
Monthly " " ..... 28·834 "
Monthly range ..... 1·390 "

Thermometer—

Highest temperature ..... 27th, 57·6°
Lowest " ..... 24th, 10°
Highest mean temperature..... 1st, 43·3°
Lowest " " ..... 14th, 17·5°
Monthly " " ..... 30·3°
Monthly range..... 47·6°

Pluviameter—

Days rain fell ..... 5, 1·42 inches.
Greatest rainfall ..... 8th, 0·59 "
Days snow fell ..... 11, 13·29 "
Greatest snowfall ..... 21st, 3·5 "
Total precipitation ..... 2·75 "

Anemometer—

	N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.	
Direction of wind..	7	13	8	5	9	22	6	15	times.

Greatest number of miles travelled in 24 hours.....30th, 710 miles.
Greatest velocity per hour .....29th, 2 p.m., 48 "
Mean for the month.....15·3 "

Clouds

Cloudy days 10
Clear days 4
Mean cloudiness for the month..... 6·7

Remarks—

The first days of March were beautiful, on the 2nd 54° temperature being registered. From the 4th to the 11th the weather was unsettled, snow falling on the 7th, rain to the

depth of 0·59 inches on the 8th, changing again to snow. From the 12th to the 18th the weather was again unsettled, with snow and rain; from the 19th to the 25th cold and mild, with some heavy winds and snow. The month ended mild, on the 27th 57·6° at two p.m. being registered.

April.

Barometer—

Highest barometer	3rd,	7 a.m.,	29·202 inches.
Lowest "	19th,	9 p.m.,	28·034 "
Highest mean barometer	5th,	....	29·020 "
Lowest " "	19th,	....	28·207 "
Monthly " "			28·810 "
Monthly range			1·168 "

Thermometer—

Highest temperature	18th,	63·4°
Lowest "	10th,	18·3°
Highest mean temperature	18th,	51·1°
Lowest " "	10th,	21·4°
Monthly " "		38·6°
Monthly range		45·1°

Pluviameter—

Days rain fell	7,	1·35 inches.
Greatest rainfall	19th,	0·86 "
Total precipitation		1·35 "

Anemometer—

	N.	E.	S.	W.	N.E.	N.W.	S.E.	S.W.
Direction of wind..	4	11	18	7	29	4	8	8 times.

Greatest number of miles travelled in 24 hours .... 20th, 626 miles.

Greatest velocity per hour	20th,	2 p.m.,	38 "
Mean for the month			13·6 "

Clouds—

Cloudy days	8
Clear days	10
Mean cloudiness for the month	2

Remarks—

April opened with a few days of warm weather, followed by cold, with north-westerly winds. During the first week rain fell to the depth of 0·41 inches. From the 9th to the 15th the weather was very changeable; the rest of the month was comparatively mild. The prevailing winds were from the north-east. April was remarkable this year for the absence of the usual April showers, that makes spring early, and the growth of the plants rapid.

May.

Barometer—

Highest barometer	18th,	7 a.m.,	29·204 inches.
Lowest "	31st,	9 p.m.,	28·312 "
Highest mean barometer	18th,	....	29·187 "
Lowest " "	31st,	....	28·403 "
Monthly " "			28·875 "
Monthly range			0·892 "

Thermometer—

Highest temperature	30th,	69°
Lowest "	2nd,	27°
Highest mean temperature	9th,	59·7°
Lowest " "	2nd,	33·4°
Monthly " "		47·63°
Monthly range		42°

Pluviameter—

Days rain fell ..... 9, 2·84 inches.
Greatest rainfall ..... 8th, 0·9 "
Total precipitation ..... 2·84 "

Anemometer—

	N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.	
Direction of wind ..	1	5	2	2	14	9	4	11	times.

Greatest number of miles travelled in 24 hours .. 12th, 762·3 miles.
Greatest velocity per hour ..... 12th, 2 p.m., 40·2 "
Mean for month ..... 13·159 "

Clouds—

Cloudy days 10
Clear days 17
Mean cloudiness for the month ..... 0·8

Remarks—

May opened chilly, the first week was rainy, followed by wind; the second was changeable, mild weather, followed by cold; the middle of the month also rainy, three days of rain in succession, the greatest depth in 24 hours being 0·75. After the 15th it was again changeable, heat followed by cold till the 22nd, when rain fell to the depth of 0·4, after which we had warmer and more settled weather. On the last day the wind was strong, and rain fell to the depth of 0·33 inches. The prevailing winds were from the north-east and south-west.

June.

Barometer—

Highest barometer ..... 22nd, 7 a.m., 29·062 inches.
Lowest " ..... 18th, 9 p.m., 28·372 "
Highest mean barometer ..... 21st, ... 29·046 "
Lowest " " ..... 3rd, ... 28·436 "
Monthly " " ..... "
Monthly range ..... 0·690 "

Thermometer—

Highest temperature ..... 25th, 86°
Lowest " ..... 3rd, 39·1°
Highest mean temperature ..... 24th, 73·5°
Lowest " " ..... 3rd, 47·5°
Monthly " " ..... 61·5°
Monthly range ..... 46·9°

Pluviameter—

Days rain fell ..... 9, 1·98 inches.
Greatest rainfall ..... 9th, 1·37 "
Total precipitation ..... 1·98 "

Anemometer—

	N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.	
Direction of wind ..	2	2	2	1	6	11	8	15	times.

Greatest number of miles travelled in 24 hours .... 1st, 514·9 miles.
Greatest velocity per hour ..... 2nd, 2 p.m., 38·4 "
Mean for month ..... 10·4 "

Clouds—

Cloudy days 12
Clear days 8
Mean cloudiness for the month ..... 2·7

Remarks—

June opened with rain and cold, the morning of the 2nd being milder was followed by a rain upon the 3rd; the 4th was dry though cloudy, rain falling upon the 5th to the

depth of 0·13 inches. There were then three days of clearer and milder weather, which were followed by two days of rain in succession, the weather was then clear and mild up to the middle of the month, after which we had it very changeable, heat followed by cold, though it was comparatively calm. The prevailing winds were from the north-west.

July.

Barometer—

Highest barometer	15th,	2 p.m.,	29·122 inches.
Lowest "	6th,	7 a.m.,	28·000 "
Highest mean barometer	15th,	....	29·080 "
Lowest " "	3rd,	....	28·274 "
Monthly " "			28·802 "
Monthly range			1·122 "

Thermometer—

Highest temperature	26th,	88°
Lowest "	22nd,	49·5°
Highest mean temperature	26th,	75°
Lowest " "	22nd,	53·8°
Monthly " "		66·9°
Monthly range		38·5°

Pluviameter—

Days rain fell	5,	
Greatest rainfall	18th,	0·245 inches.
Total precipitation		0·301 "

Anemometer—

	N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.	
Direction of wind..	2	1	14	3	3	12	1	14	times.
Greatest number of miles travelled in 24 hours..						31st,	355·9		miles.
Greatest velocity per hour						25th,	25·5		"
Mean velocity for the month							9·264		"

Clouds—

Cloudy days	23
Clear days	4
Mean cloudiness for the month	6·4

Remarks—

The anemometer was not in working order during the first two weeks of the month, the statistics given apply, therefore, only to the last two weeks.

July opened with mild weather and equal temperature. During the first week the barometer was unsteady, falling low upon the 6th, then suddenly making a great rise on the 8th, accompanied by a northerly wind. It fell steadily on the 9th, 10th, and 11th, with a corresponding fall in the temperature during the evenings, and with light showers on the 9th and 10th. On the 12th we had another fall both in the atmospheric pressure and in the temperature, with rain to the depth of 0·22 inches. We then had a steady rise in the barometer, and clear bright weather up to the 16th, when the barometer fell. The weather became sultry, and a rainfall to the depth of 0·245 inches. The barometer then rose steadily to the end of the month, accompanied by fine weather.

August.

Barometer—

Highest barometer	18th,	2 p.m.,	29·988 inches.
Lowest "	9th,	7 a.m.,	28·505 "
Highest mean barometer	18th,	....	29·316 "
Lowest " "	8th,	....	28·558 "
Monthly " "			28·892 "
Monthly range			1·483 "

Thermometer—

Highest temperature	6th, 87·5°
Lowest "	20th, 42·5°
Highest mean temperature	15th, 75°
Lowest " "	18th, 57·5°
Monthly " "	65·7°
Monthly range	45°

Pluviameter—

Days rain fell	11,
Greatest rainfall	22nd, 1·12
Total precipitation	3·78

Anemometer—

	N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.	
Direction of wind..	5	6	8	5	6	6	8	10	times.

Greatest number of miles travelled in 24 hours.. 14th, 395·6 miles.
Greatest velocity per hour ..... 15th, 36 "
Mean velocity for the month ..... 7·866 "

Clouds—

Cloudy days	18
Clear days	10
Mean cloudiness for the month	6·06

Remarks—

August opened with a high barometric pressure and moderate temperature, the pressure gradually decreasing, accompanied on the 2nd by a warm rain. During the 4th, 5th, and 6th the weather was mild and pleasant, with a warm southerly wind. Up to the 15th pressure was unsteady, and the winds variable, the latter continuing to the end of the month. On the 6th, 7th, 8th, and 9th we had rain to a total depth of 1·99 inches. The weather was mild during the day and cool at night. We had very little thunder this month.

September.

Barometer—

Highest barometer	25th, 9 p.m.,	29·270 inches.
Lowest "	14th, 9 a.m.,	27·560 "
Highest mean barometer	25th, ...	29·238 "
Lowest " "	14th, ...	28·599 "
Monthly " "		28·818 "
Monthly range		0·710 "

Thermometer—

Highest temperature	18th, 85·5°
Lowest "	24th, 39·5°
Highest mean temperature	2nd, 75°
Lowest " "	26th, 50·5°
Monthly " "	60·31°
Monthly range	46°

Pluviameter—

Days rain fell	5	
Greatest rainfall	22nd, 1·9	inches.
Total precipitation	1·312	"

Anemometer—

	N.	E.	W.	S.	NE.	NW.	SE.	SW.	
Direction of wind..	6	8	7	4	12	7	5	6	times.

Greatest number of miles travelled in 24 hours .. 14th, 808 miles.
Greatest velocity per hour ..... 14th, 48.5 "
Mean for the month ..... 8.789.

Clouds—

Cloudy days	16
Clear days	11
Mean cloudiness for the month	6.6

Remarks—

September opened warm and sunny, continuing so up to the middle of the month. The barometric pressure was high but unsteady, and the winds variable, the weather being for the most part mild and pleasant. On the 13th rain fell to the depth of ·4 inches, when the wind varied from south-east to east.

The morning of the 14th was cloudy, with a low barometer and a south-west wind, which increased during the day to a fresh gale, veering to the northwest towards evening. It then moderated, being accompanied by a fall in the temperature, this was followed by a few days of pleasant weather when the wind varied from south to south-west.

During the 21st, 22nd, and 23rd, the weather was again unsteady, with cooler weather and a rainfall of ·01, 1·9 and ·001 inches respectively.

The last week was very pleasant with a light breeze from the north-east and east, and a local shower on the 27th. During this week the atmospheric pressure was steady. The reading of the barometer was as high as 29·270 and did not fall below 29°.

October.

Barometer—

Highest barometer	6th, 2 p.m.,	29·172 inches.
Lowest "	9th, 7 a.m.,	28·562 "
Highest mean barometer	3rd, ...	29.146 "
Lowest " "	9th, ...	28·654 "
Monthly " "		28·911 "
Monthly range		0·610 "

Thermometer—

Highest temperature	7th, 79°
Lowest "	25th, 30°
Highest mean temperature	7th, 63·7°
Lowest " "	20th, 42·8°
Monthly mean temperature	52·8°
Monthly range	49·0°

Pluviameter—

Days rain fell	2, 1·126 inches.
Greatest rainfall	14th, 1·20 "

Anemometer—

N.	E.	W.	S.	N.E	N.W.	S.E.	S.W.
Direction of winds.. 6	6	7	7	7	5	6	14 times.

Greatest number of miles travelled in 24 hours..... 9th, 594·7

Greatest velocity per hour .....

Mean for the month ..... 9·82486

Clouds—

Cloudy days	14
Clear days	11
Mean cloudiness for the month	6.4

Remarks—

October opened with a high pressure and a pretty steady temperature, the weather being very pleasant and continuing so during the whole month. October, usually a rainy month, was this year remarkable for its dryness. There were only two days of rain; one on the 14th, when it fell to the depth of 1·20 inches, and the other on the 31st when it fell to the depth of 0·06 inches. This remarkably dry October has given a check to the growth of fall wheat. The prevailing winds were from the south-west.

Barometer— *November.*

Highest barometer	2nd, 9 p.m.,	29·410 inches.
Lowest "	24th, 7 a.m.,	28·376 "
Highest mean barometer	2nd, ...	29·364 "
Lowest " "	23rd, ...	28·595 "
Monthly " "		28·948 "
Monthly range		1·034 "

Thermometer—

Highest temperature	11th, 67°
Lowest "	30th, 11·5°
Highest mean temperature	11th, 56·8°
Lowest " "	30th, 21°
Monthly " "	34·06°
Monthly range	55·5°

Pluviameter—

Days rain fell	5, 0.565 inches.
Greatest rainfall	12th, 0·41 "
Days snow fell	1, 6·0 "
Greatest snowfall	27th, 6.0 "
Total precipitation	1·165 "

Anemometer—

	N.	E.	W.	S.	N.E.	N.W.	S.E.	S.W.	
Direction of wind..	2	9	15	1	21	5	7	14	times.

Greatest number of miles travelled in 24 hours..... 13th, 1066·6
Greatest velocity not observed.
The mean velocity for the 13th was ..... 44·4
Mean velocity for the month..... 10.498

Clouds—

Cloudy days	20
Clear days	6
Mean cloudiness for the month	4·45

Remarks—

The first days of November were beautiful, with a wind varying from west to north-west and north-east, and a clear sky and even temperature.

From the 5th to the 15th the sky was overcast, the temperature continuing steady. During this time we had occasional mists and slight showers of rain.

The latter half of the month was frosty and the sky overcast. On the 26th we had the first snow storm and the first sleighing of the season.

This month has been very pleasant and remarkably free from early frosts and wet weather.

December—1st to 15th.

Barometer—

Highest barometer	3rd, 9 p.m.,	29·080 inches.
Lowest "	13th, 2 p.m.,	28·258 "
Highest mean barometer	8th, ...	28·988 "
Lowest " "	13th, ...	28.374 "
Monthly " "		28·728 "
Monthly range		0·822 "

Thermometer—

Highest temperature	4th, 50°
Lowest "	8th, 4°
Highest mean temperature	4th, 34.5°
Lowest " "	8th, 8°
Monthly " "	22°
Monthly range	46°

Pluviameter—

Days snow fell	5, 16	inches.
Greatest snowfall	10th, 6	"
Total precipitation	1·6	"

Anemometer—

	N.	E.	S.	W.	N.E.	N.W.	S.E.	S.W.	
Direction of wind..	2	2	0	11	2	9	2	13	times.

Greatest number of miles travelled in 24 hours....	13th, 590	miles.
Greatest velocity per hour	7th, 32	"
Mean for the month	13·5	"

Clouds—

Cloudy days	13
Clear days	none.
Mean cloudiness for the month	3

Remarks—

This month has been so far cloudy, accompanied by variable winds and snow storms. One heavy snow storm occurred on the 10th, when snow fell to the depth of 6 inches. On the evening of the 7th it stormed furiously. The temperature has been fairly steady, except upon the two occasions of the maximum and minimum readings, when it rose and fell remarkably. The mean temperature of the day before the maximum was taken was 25°. The barometer has been very steady, and the range consequently small.

MEAN METEOROLOGICAL RESULTS FOR THE YEAR 1882.

	1882. Guelph.	Average of 40 years. Toronto.
Barometer—		
Mean pressure for the year	29·214	29·616
Month of highest mean pressure	January.	September.
Highest mean, monthly	29·424	29·664
Lowest " "	28·207	29·572
Month of the lowest mean	April.	June.
Date of the highest pressure in the year	August 18th.	
Highest pressure	29·988	30·358
Date of the lowest pressure in the year	July 6th.	
Lowest pressure	28·000	28·692
Range of the year	1·988	1·668
Thermometer—		
Mean temperature of the year	44°	44·17°
Warmest month	July.	July.
Mean temperature of the warmest month	66·9°	67·64°
Coldest month	January.	February.
Mean temperature of the coldest month	20·5	22·73°
Warmest day	July 26th.	
Mean temperature of the warmest day	75°	77·85°
Coldest day	January 24th.	
Mean temperature of the coldest day	—7·5	—1·50°
Date of the highest temperature	July 26th.	
Highest temperature	88°	91°
Date of lowest temperature	January 24th.	
Lowest temperature	—22	11·9°
Range of the year	110	102·0°

MEAN METEOROLOGICAL RESULTS FOR THE YEAR 1882—*Continued.*

	1882. Guelph.	Average of 40 years. Toronto.
Pluviameter—		
Total depth of *rain* in inches	18·24	28·30
Number of days on which *rain* fell	67	110
Month in which the greatest depth of *rain* fell	August.	September.
Greatest depth of *rain* in one month	3·78	3·55
Month with most *rainy* days	August.	October.
Greatest number of *rainy* days in one month	11	13
Day on which the greatest amount of *rain* fell	22nd Sept'r.	
Greatest amount of *rain* in one day	1·9	1·98
Total depth of *snow* in inches	57·25	
Number of days on which *snow* fell	31	
Month in which the greatest depth of *snow* fell	December.	
Greatest depth of *snow* in one month	16·0	
Month with most *snowy* days	March.	
Greatest number of *snowy* days in one month	11	
Day on which the greatest amount of *snow* fell	Nov. 27th. Dec. 9th.	
Greatest amount of *snow* in one day	6·0	
Total precipitation in inches	22·96	

Your obedient servant,

R. B. HARE,

Professor of Chemistry and Lecturer on Geology and Meteorology.

PART III.

REPORT

OF THE

PROFESSOR OF BIOLOGY.

ONTARIO AGRICULTURAL COLLEGE,
December 31st, 1882.

To the President of Ontario Agricultural College:

SIR,—I have the honour to present to you the first report of work done in the Biological department in connection with the Ontario Agricultural College. Hitherto the work of this department has been divided between two Professors, with the result, that owing to their own proper work occupying the greater portion of their time and attention, this department did not receive as much notice or care as its importance warranted, although those to whom it was entrusted bore their extra burden in a most praiseworthy manner.

The department, as existing in this College, embraces several sub-departments, those portions of the science having a more important bearing on Agriculture being advanced to that degree. To illustrate my meaning it will perhaps be well to enumerate the various sub-departments, stating briefly the aim of each. In the first year a student receives lectures in the sub-departments of Zoology and Botany. Now these, in reality, include the entire science of Biology, but as recognized here merely embrace the rudiments of the study, which, when thoroughly mastered by the student, will enable him to proceed intelligently with the studies of branches of much more importance from an agricultural point of view. In the second year there is, first, a course on Entomology, in which the various injurious and beneficial insects are described as to their appearance, habits, etc., and the mode of preventing the ravages of the former; second, Economic Botany, in which the various plants furnishing mankind with food, clothing, luxuries, etc., are considered, as well as the methods by which these products are obtained; third, Systematic Botany, in which the student learns the characters of the more important orders of plants, and is shewn as far as possible the various plants indigenous to Canada, and taught to recognize them; fourth, Horticulture is also included in the department. By this, however, is meant Horticulture from a theoretical point of view, the points taken up being the physiological phenomena accompanying, and upon which the various operations are based, as will be seen by a glance at the detailed synopsis of the course of lectures given elsewhere, from which also a better idea of the points touched upon in the lectures of the various sub-departments will be obtained.

In addition to these subjects—the proper work pertaining to the department—I delivered a number of lectures on English Literature and English Composition, the majority in fact of the lectures given in the English Department.

During the past year I experienced some difficulty in preparing my lectures, being obliged to select certain subjects for explanation and detailed description, neglecting or merely touching others which were of quite as much importance in some cases as those treated of. The necessity for this procedure arose from the impossibility of overtaking the entire subject of Biology satisfactorily in a two years' course, and also from the small amount of time the student is enabled to spend at each subject owing to the multiplicity

of studies he has to occupy his attention, I therefore became curious to ascertain, more fully than I had hitherto done, how the department was conducted in other agricultural institutions, and for that purpose made a study of the curricula of the various colleges at my disposal. As a result of these investigations, I find that, in the first place, the various subjects of the department are divided up among several professors, and, secondly, which I wish to lay stress upon, the course is invariably either of *three* or *four* years, and the various studies are spread over these, so that the student not only does more work than he does here but does it more thoroughly and with greater benefit to himself. But not only is more time a necessity, but practical work is also ; for without this the student cannot study with any great degree of satisfaction, while with it he has more interest in his work, more easily understands the lectures, and more readily retains the facts which are told him. Now, in a large class of sixty or seventy, practical biological work is difficult even if there were time and apparatus for so large a number of students.

In order, then, to overcome these various difficulties, and make not only the biological course but the others also more beneficial and interesting, I would beg to make the following suggestion, which would perhaps come more appropriately from the President, but which, as closely concerning the future success of my department, I feel myself entitled to make. My suggestion is as follows :—Let the course be increased to three years. During the first two years the student should be obliged to pursue the same studies as at present, and if, at the conclusion of his second year he succeed in passing an examination in the various studies, he then be allowed to specialize. For this purpose the third year course might be divided into various departments, such as Agriculture, Horticulture, Veterinary Science, Biology, Chemistry, and Mathematics, one or more of which the student might be allowed to pursue, receiving instruction in the higher and more practical portions of that study. In my own department, for instance, the student would enter more fully into the Physiology of Plants, performing various experiments for himself ; he would follow out, by the aid of the microscope, the life-history of the various fungi which are injurious to economic plants, such as Rust, Black Knot, etc., and thus gain an insight into the methods to be pursued in such studies. Again, his Entomological studies might be pursued still farther, collection and identification of various species of insects forming the basis of his work, as well as experiments to discover the best and cheapest method of preventing the ravages of injurious forms, for which of course a complete knowledge of the life-history and habits would be necessary as a preliminary. In the other departments courses of equal interest and benefit might be followed, and thus the third year would be made really the most instructive of the course. I am of the opinion that such an arrangement would be for the best advantage of the College, and through it to the community at large, and therefore I submit it to your consideration.

The Museum.

It falls to my lot also, as Curator, to report upon the state of the Museum. To this important department, I am happy to say, some additions have been made during the past year. In the first place, I must mention several cases of insects deposited by Mr. Arthur Nicol, the contents of which have since been for the most part identified, and which, with the specimens originally in the Museum, embrace most of our common and some of the rare Canadian forms. Through the kindness of our Professor of Agriculture, Mr. Brown, we have also been enabled to obtain possession of a fine specimen of *Alligator Mississippiensis*, and some other specimens of Southern fauna, and lately the same gentleman has added to our Agricultural section a valuable collection of Manitoba products, soils, etc. One of our late students presented me with some curious seeds belonging to several Jamaica plants, which I have placed in the Botanical section, and to the Zoological collection I have had the honour of adding a few specimens illustrating the Canadian reptilian fauna.

So much for the Agricultural and Biological sections. The Geological section has received a valuable addition in the shape of a fine collection of minerals, over one hundred in number, obtained from Messrs. Ward and Howell, of Rochester, N.Y., a long felt want being thus supplied.

The past year, accordingly, has been to the Museum a comparatively prosperous one,

but there are still many important objects that ought to be found in the museum of an Agricultural College which are yet wanting. We should have, for instance, our fine collection of farm products from various parts of Canada supplemented by a collection of fruits, etc., and also by a collection of abnormalities and diseased products.

Secondly, we are in great want of a good collection of Canadian birds. This would be exceedingly instructive, as students might then be taught to recognize those birds which are destructive and those that are beneficial.

And, thirdly, although possessing an average collection of insects, we are entirely destitute of a collection of larval forms. Such a collection is of even more importance, from an agricultural point of view, than one of mature insects, for in the majority of cases it is the larvæ which destroy vegetation. A very interesting and instructive collection might be made by combining the mature insect, the larva, and a specimen showing the nature of the injury perpetrated by the latter or former, as the case might be. Thus, for instance, one example would be a specimen of the Pine-borer *(Monohammus confusor)*, the boring grub, and a piece of wood showing the galleries eaten out by the pest. I think it is patent to every one that such a collection could not fail to be of great educational value.

Many additions in each of these groups might be readily made, and I would call upon our various friends throughout the country to assist us in this matter. I made an appeal to the students last spring with a certain amount of success, and I now wish to extend it still farther. In the country many valuable examples of ravages occasioned by our insect foes may be obtained, for instance, when chopping in winter, examples of the galleries of borers may be met with, or even the borers themselves, and many important and useful objects might be brought to the notice both of the students and the farming community at large by sending them to our Museum.

Appended to this report will be found a catalogue of the specimens at present in the Museum.

Private Investigations.

There is one more subject that requires notice in this report—my own private work and investigations. Concerning these, I regret to say, I have not much to report. As will be seen from the commencement of this report, the subjects upon which I lecture are comparatively numerous, and the lectures must necessarily occupy considerable time, outside that taken up in their delivery, in preparation; and also the want of a proper laboratory has militated very largely against the performance of any series of experiments or the conducting of any series of investigations.

Notwithstanding these obstacles to private study, I have been able to do a certain amount of work outside that actually incumbent on my position. In the first place, on my entry upon the duties of Curator of the Museum, I found that much was required in the way of arrangement and naming of specimens; to these necessities I gave my attention, and succeeded to a certain extent in overcoming the confusion, though there is much yet to be done.

In addition to this I succeeded in carrying on certain investigations on two subjects. Professor Brown desired me to report upon the diameter and structure of a certain number of wools of different varieties of sheep, and after a series of microscopical examinations extending over several weeks, I presented him with a letter containing the results. Concerning these, however, I need say no more here, as they have already appeared in the Advance Report published some months previous.

The other subject to which I referred above was the fungus which is the cause of the disease known as "Black Knot," and although my studies did not result in the discovery of any new points in the life-history of this interesting form, nor clear up in any degree the points still involved in obscurity, still it may be interesting and instructive to review its life-history as at present known.

As above stated, the disease is due to the presence of a fungus, known technically as *sphæria morbus*. A fungus may be considered as consisting of two portions, viz., a *vegetative* portion, whereby the plant obtains nutriment from the structure on which it lives, and a *reproductive* portion whereby the species is perpetuated and extended. The latter is dependent upon the former, for without a proper supply of nourishment it is not pos-

sible for the plant to mature, or in other words to form its organs of reproduction. I shall, accordingly, first describe the structure and function of the vegetative organs.

Imbedded in the wood of the "knot" at an early stage may be found numbers of small clear silk-like threads, very minute and observable only by the aid of the microscope. These ramify amongst the cells which compose the tissue of the inner bark of the tree, and absorb from them nutriment which has been elaborated by the roots of the tree from the soil, and is usually known as sap. The fungus injures the tree by taking away from it nutriment which would otherwise go to form fruit and wood, and thus undermines its strength and vigour. The whole of the knot, however, is not composed of these fine threads, which eventually become matted together to form what is known as "false tissue," but is formed largely by an increased growth of the tissues in that part, a portion of the nutriment formed by the leaves and roots being diverted from its natural and proper use for this purpose. The process may in fact be likened to what occurs in our own bodies when any foreign matter is introduced beneath the skin. Inflammation ensues, resulting in swelling, caused by increased proliferation of the cells composing the injured parts. Accordingly, the fungus is injurious in two ways; 1st, by absorbing a certain amount of nutriment from its "host," and, 2nd, by diverting the nutriment from its proper use to form a knot or useless mass of tissue. The origin of the fungus is the seed, or what are technically termed "spores," which are afterwards to be described. These falling upon a tree, are nourished by moisture and heat, and sprout, sending off one of the threads which penetrates in between the cells of the "host," and branches abundantly. In the following spring these threads, which have been growing vigorously, and which have matted together into the false tissue, and the overgrowth of the tissues of the tree, burst through the bark. The knot-like mass grows rapidly, the fungus deriving an excess of nourishment from the rich ascending sap, and soon reaches its full size, which varies from one to six inches in length, and from two-fifths to one and a fifth deep.

The fungus now proceeds to make provision for its perpetuation and dissemination by the formation of reproductive organs or "spores." These, as in many other fungi, are of different varieties, one kind being produced at one season of the year and another at another.

First of all, in the spring and summer, after it has become mature, the knot becomes somewhat velvety in appearance, this being due to the vegetative threads sending up myriads of short jointed filaments which stand out upon the surface. If one of these be examined by the microscope it will be seen to bear one or two egg-shaped pointed spores, technically known as *conidiospores*, the little filaments being termed *conidia*. These *conidiospores* are exceedingly small, and fall off when ripe with the slightest touch, and are so light that the smallest breath of wind will carry them some distance. Falling in this manner on other trees, or on another spot on the same tree, and being supplied with moisture, they will germinate, and eventually produce another knot. Their formation continues until late in the summer, when the filaments which bear them wither away and disappear.

At this time another set of spores begins to be formed, but requires the greater part of the winter to come to perfection, reaching that state about February. If, during the winter, the surface of the knot be examined, it will be found to be covered with minute pores. An exceedingly thin section through one of these, being placed under the microscope, it is seen that these pores open into a cavity, the walls of which bear (1st) a large number of slender filaments, scattered among which are (2nd) club-shaped structures, termed *asci*, from a Greek word signifying a basket or receptacle. If the winter be well advanced these will be seen to contain a number of ovate bodies termed *ascospores*, which, when ripe, pass out of an opening which forms at the extremity of each *ascus*, and so escape. Falling in a suitable place, these germinate similarly to the *conidiospores* and produce knots.

Such are the contents of the majority of the cavities, but among them will be found a certain number which contain other structures. Some will contain very minute spores divided apparently into four chambers, and borne on the extremity of delicate filaments. These are termed *stylospores*. Their function is as yet unknown, but in all probability they constitute another variety of reproductive organ.

Other cavities contain exceedingly slender filaments termed *spermtia*. These have

never been seen to germinate, but from their close resemblance to structures occurring in other fungi closely related to *sphæria morbus* which have been seen to do so, it is probable that they too are reproductive, and that from their exceeding minuteness "they are the agents for the dissemination of the species to a distance."

Lastly, other cavities are lined with short delicate filaments which end in a minute oval hyaline body; these small structures are formed in immense numbers, and ooze out from the cavities in which they grow in long jelly-like masses. These are the *pycnidiospores*, and, like the spermatia, their function, as far as the fungus under consideration is concerned, is doubtful, but the probability is that they have a similar function to those structures.

We thus see that in this fungus we have no less than five different varieties of reproductive organs, viz.: *conidiospores*, *ascospores*, *stylospores*, *spermatia*, and *pycnidio-spores*, and hence the perpetuation and extension of the disease is inevitable, unless measures to combat it are taken promptly upon its appearance. The variety of spores, or at any rate the enormous number of them, is characteristic of all parasitic fungi, and also parasitic animal forms, and is a provision of nature to ensure their perpetuation. For organisms, whose mode of life is of this nature, are manifestly at a disadvantage as far as the dissemination of the species is concerned, there being difficulties in the way of the spores falling in situations favourable to their development. Ordinary plants have the entire surrounding country in which their seeds can grow, while with parasitic fungi there are only one or two plants upon which each one will grow. For instance, "Black Knot" only attacks plums and cherries, "ergot" only rye and a few grasses, "rust" only wheat and oats, one variety of "smut" only wheat, and another only Indian corn. Myriads of the spores are consequently wasted, not being carried to another "host" of the same species as that from which they came, while others again, though meeting a proper "host," do not receive the necessary amount of heat and moisture to cause them to develop.

As regards the means to be adopted for the destruction of the disease, of course there can be nothing, as far as the individual trees are concerned, as useful as its complete extirpation by the knife, and the use of salt to cover the wound and aid in the destruction of any filaments that may have escaped the knife. But there is one point which I think should be insisted upon very strongly, namely, that the knot when cut out ought not to be merely thrown aside, but should be immediately burned. If this be not attended to the remedy will have only a partial effect, for the result will be that the fungus, being deprived of a proper supply of nourishment, will immediately apply that which it has obtained to the production of spores, just as any fruit will ripen more rapidly when cut off from the tree which bears it. The spores, being formed, will immediately be carried about by the wind, which is the principal agency in their dissemination, their exceeding minuteness rendering them peculiarly fitted for being carried long distances, and the disease will thus spread almost as rapidly as if it were neglected. Burning is an important agent in the destruction of the fungus, and should on no account be neglected.

The most suitable time for cutting out the knot depends altogether on what stage it is in. Of course the proper time is immediately it is noticed, and before it can have time to form spores, but frequently attention is not paid to it for some time, the cultivator being occupied with other matters, and accordingly a definite time should be set aside for its destruction. Now, as we have seen the *ascospores* and others become ripe in February, and the *conidiospores* in the following summer, so that the winter or late fall would be the preferable times if any are to be appointed. I would again state that it is the duty of every cultivator to eradicate the disease and burn the knots as soon as they appear.

In conclusion, I would point out the great necessity of proceeding at once with the erection of new conservatories and a botanical laboratory. Without the latter it cannot be expected that any satisfactory work can be done, while with it many important investigations might be carried on, important not only from a scientific point of view, but also to the practical farmer.

I have the honour to be, Sir,
Your obedient servant,

J. Playfair McMurrich,
Professor of Biology and Horticulture.

CATALOGUE OF MUSEUM.

Ontario Agricultural College.

A. Agricultural Section.

1. Specimens of Canadian wheats:

(1) Deihl wheat.
(2) Deihl fall wheat.
(3) White wheat.
(4) Soulis wheat.
(5) Farrow wheat.
(6) Golden drop wheat.
(7) Club wheat.
(8) Mammoth wheat.
(9) Rio Grande wheat.
(10) Fyfe wheat.
(11) Glasgow wheat.
(12) Scotch wheat.
(13) Red chaff wheat.
(14) Scott fall wheat.
(15) Seneca fall wheat.
(16) Mediterranean wheat.
(17) Black Sea wheat.
(18) Blue stem fall wheat.
(19) Western spring wheat.
(20) Wick's spring wheat.
(21) Manitoba wheat.

2. Specimens of Canadian barleys:

(1) Hulless barley.
(2) 6-rowed barley.
(3) Black barley.
(4) 4-rowed barley.
(5) 2-rowed barley.

3. Specimens of Canadian oats:

(1) Black or Tartarian oats.
(2) Black Poland oats.
(3) Black Brunswick oats.
(4) Black Norway oats.
(5) Bearded Tartarian oats.
(6) Common white oats.
(7) Large white oats.
(8) Sparable black oats.
(9) Surprise oats.
(10) Bohemian oats.
(11) White blade oats.
(12) Sparable white oats.
(13)
(14) Hopetoun oats.
(15) Australian oats.
(16) Potato oats.
(17) Emporium oats.
(18) Californian oats.
(19) Side oats.
(20) Middleton oats.
(21) New Zealand oats.

4. Specimens of Canadian ryes.

5. Specimens of Canadian Buckwheats:

(1) Common buckwheat.
(2) Siberian buckwheat.
(3) Silver hull.

6. Specimens of Canadian peas:

(1) Small field peas.
(2) Small white peas.
(3) Hybrid white peas.
(4) Gold drop peas.
(5) Golden vine peas.
(6) White marrowfat peas.
(7) Black eye marrowfat peas.
(8) Irish marrowfat peas.
(9) June peas.
(10) Early June peas.
(11) Excelsior peas.
(12) California peas.
(13) Dan O'Rourke peas.
(14) Crown peas.
(15) Multiplier peas.
(16) Early Washington peas.
(17) Shady vine peas.
(18) Creeper peas.
(19) Caractus peas.
(20) Grass peas.
(21) Tom Thumb peas.
(22) Aberdeen peas.
(23) Brown peas.
(24) Prince Albert Peas.
(25) Blue fill-basket peas.
(26) Blue Imperial peas.
(27) Blue Prussian peas.
(28) Philadelphia peas.
(29) European peas.
(30) Champion of England peas.

CATALOGUE OF MUSEUM—*Continued.*

7. Specimens of Canadian beans :

(1) White field beans.
(2) Marrowfat beans.
(3) Small white beans.
(4) Dwarf white wax beans.
(5) Small marrowfat beans.
(6) White kidney beans.
(7) Six week beans.
(8) Early China beans.
(9) Butter beans.
(10) White marrowfat beans.
(11) Large white beans.
(12) Navy field beans.
(13) Small field beans.
(14)
(15)
(16) Black butter beans.
(17) Bush butter beans.

8. Specimens of Canadian tares.

9. Specimens of Canadian vetches.

10. Specimens of Canadian flours :

(1) Coarse shorts.
(2) Shorts.
(3) Bran.
(4) Coarse Graham flour.
(5) Fine Graham flour.
(6) Granulated wheat.
(7) Spring wheat flour.
(8) Superior flour.
(9) Snowflake flour.
(10) Farmer's grist.
(11) Strong baker's flour.
(12) Superfine flour.
(13) Extra flour.
(14) Super. extra flour.
(15) XXX super. extra flour.
(16) Extra white flour.
(17) Family flour.
(18) Extra family flour.
(19) Buckwheat flour.

11. Specimens of Canadian oatmeals :

(1) No. 1 coarse oatmeal.
(2) No. 2 medium oatmeal.
(3) No 3 fine oatmeal.
(4) Fine oatmeal.
(5) Standard oatmeal.

12. Specimen of Canadian corn meal.

13. Specimens of Canadian wild rice :

(1) Natural state. (2) Parched wild rice.

14. Specimens of Canadian beet seeds :

(1) Long blood beet.

15. Specimen of Canadian carrot seed.

(1) White Belgiam carrot.

16. Specimen of Canadian turnip seed :

(1) Gripstone turnip.

17. Specimens of Canadian millet seed :

(1) Common millet. (2) Broom corn millet. (3) Chinese millet.

18. Specimens of Canadian fodder seeds :

(1) Timothy. (2) Clover. (3) Hungarian grass.

19. Specimens of Canadian flax seeds.

20. Specimens of Manitoba produce :—

(1) Winter wheat; sown Sep. 1881, appeared above ground May 1st, 1882, cut August 14th, 1882; near Edmonton.
(2) Wheat from Edmonton : yields 17½ bushels for every bushel sown.
(3) Club wheat from Geo. Rath's farm, Edmonton.

CATALOGUE OF MUSEUM—*Continued.*

(4) Club wheat from farm of Mr. James Gullen, Edmonton.
(5) Club wheat, harvested August 29th, 1882, from farm of Mr. Price, near Edmonton.
(6) Club wheat from Fort Victoria.
(7) Winter wheat from Mr. Barwick's farm, near Edmonton.
(8) Wheat from farm of Stipendiary Magistrate, Lieut-Col. Richardson, at Battleford.
(9) Wheat sown in spring of 1882; Edmonton.
(10) Fyfe Wheat from Prince Albert.
(11) Stool of wheat from single grain; from farm of Chief Factor Hudson Bay Co., Edmonton.
(12) Bearded wheat sown May 1st, harvested August 29th, yielding over 30 bushels to the acre. From farm of W. Barwick, near Edmonton.
(13) Bearded wheat from Mr. Price's farm near Edmonton; cut August 29th, 1882.
(14) Wheat from bad grain.
(15) Barley from Mr. Price's farm. near Edmonton.
(16) Barley from Donald Ross' farm, Edmonton.
(17) Barley from Geo. Rath's farm, Edmonton; sown May 27th, harvested August 24th, 1882.
(18) Barley from farm of John Peacock, Edmonton.
(19) Six-Rowed barley, sown first week in July, cut Aug. 28th. D. McLeod's farm, Edmonton.
(20) Oats from farm of Donald Ross, Edmonton.
(21) Oats from farm of Donald Ross, Edmonton.
(22) Head of oats, contained 546 grains when lifted.
(23) Rocky Mountain rye; stool from one grain. From farm of John Peacock, Edmonton.
(24) Field peas; from D. Ross, Edmonton.
(25) Wild peas; natural growth, from Clover Bar.
(26) Potatoes from Edmonton.
(27) Prairie grass; natural growth. From Clover Bar, 7 miles from Edmonton.
(28) Wild hops. Edmonton.
(29) Wild vetches; natural growth. Clover Bar District, 7 miles from Edmonton.
(30) Coal from Edmonton.
(31) Coal from Pelly River District.
(32) Iron ore boulder; from Mr. Tanner's farm, Edmonton.
(33) } Soils from Edmonton.
(34) }

21. Models of Agricultural Implements, from Hohenheim, Germany:

(1) Hohenheim plough. Construction A.
(2) Hohenheim plough. Construction B.
(3) Hohenheim plough. Construction C.
(4) Hohenheim plough. Construction C*
(5) Hohenheim plough. Construction D.
(6) Sub-soil plough.
(7) Roville harrow.
(8) Harrow, adjustable.
(9) Brabant harrow.
(10) Drill, single.
(11) Sowing and harrowing machine.
(12) Roller, with three cylinders.
(13) Marker.
(14) Ditching plough.
(15) Horse cultivator, with seven teeth.
(16) Hand water waggon.
(17) Horse scoop.
(18) Improved Corn mill, from Berne.
(19) American machine for removing corn from cob.
(20) Turnip cutter.
(31) French wheat cleaner: removes cockle.
(22) Hohenheim fruit press.
(23) Improved Swabian cider press.
(24) Esslingen grape press.
(25) Press for manufacturing drain tiles.
(26) Heilbronn grape press.
(27) English hand flour-mill.
(28) Crib for feeding sheep.
(29) Frame for drying grain.
(30) Williams' draining shovels.
(31) Hoe-shovel.
(32) Instrument for planting potatoes, etc.
(33) Spinning wheel.

CATALOGUE OF MUSEUM—*Continued.*

22. Models of Agricultural Machines, manufactured by Borrosch & Jasper, Prague, Austria. These, owing to the absence of the manufacturers' catalogue, cannot be classified.
23. Bee-hive.
24. Head of steer, pure Devon.
25. Head of Boar, Windsor.

B—Veterinary Section.

1. Model of Horse in papier maché.
2. Model of Cow in papier maché.
3. Model of Horse in plaster of Paris, showing muscles.
4. Specimen of Tubercular deposit on vocal cords of cow.
5. Specimen of Post-pharyngeal abscess in cow.

C—Biological Section.

I.—*Botanical Sub-section.*

1. Case, containing 100 varieties of wood:—

(1) Acer campestre, L.
(2) Acer dasycarpum, L.
(3) Acer Negundo, L.
(4) Acer platanoides, L.
(5) Acer pseudoplatanus, L.
(6) Acer saccharinum, L.
(7) Acer tartaricum, L.
(8) Æsculus hippocastaneus, L.
(9) Æsculus rubicunda, Lois.
(10) Ailanthus glandulosa, L.
(11) Alnus glutinosa, W.
(12) Aluns incana, W.
(13) Amelanchier botryapium, Dec.
(14) Amorpha fruticosa, L.
(15) Amygdalus communis, L.
(16) Abies excelsior, D.
(17) Abies pectinata, D.
(18) Betula alba, var.
(19) Betula alba, L.
(20) Bignonia catalpa, L.
(21) Carpinus betulus, L.
(22) Castanea vesca, G.
(23) Cornus mascula, L.
(24) Celtis Australis, L.
(25) Celtis crassifolia, L.
(26) Cercis Canadensis, L.
(27) Cornus alba, L.
(28) Cornus sanguinea, L.
(29) Corylus avellana, L.
(30) Cratægus oxyacanthus, L.
(31) Cytisus alpinus, L.
(32) Elæagnus hortensis, Bieb.
(33) Fagus sylvatica, L.
(34) Fraxinus excelsior, L.
(35) Fraxinus Americana, L.
(36) Fraxinus pubescens, L,
(37) Gingko biloba, L.
(38) Gleditschia triacanthus, L.
(39) Gymnocladia Canadensis, Lam.
(40) Hippophaë rhamnoides, L.
(41) Ilex aquifolium, L.
(42) Juglans nigra, L.
(43) Juglans regia, L.
(44) Juniperus communis, L.
(45) Juniperus Virginiana, L.
(46) Kœlreuteria paniculata, Lax.
(47) Larix Europœa, Dec.
(48) Ligustrum vulgare, L.
(49) Liriodendron tulipifera, L.
(50) Morus alba, L.
(51) Morus papyrifera, L.
(52) Paalownia imperialis, Sieb.
(53) Pinus laricio—austriaca, T.
(54) Pinus cembra, L.
(55) Pinus cedrus, L.
(56) Pinus mughus, Jacq.
(57) Pinus strobus, L.
(58) Pinus sylvestris, L.
(59) Platanus acerifolia, W.
(60) Populus nigra, L.
(61) Populus tremula, L.
(62) Prunus avium, L.
(63) Prunus cerasus, L.
(64) Prunus domestica, L
(65) Prunus mahaleb, L.
(66) Prunus institia, L.
(67) Prunus spinosa, L.
(68) Prunus padus, L.

CATALOGUE OF MUSEUM—*Continued.*

(69) Prunus Virginiana, L.
(70) Ptelea trifoliata, L.
(71) Pyrus communis, L.
(72) Pyrus malus, L.
(73) Pyrus torminalis, Ehrh.
(74) Quercus cerris, L.
(75) Quercus pedunculata, S.
(76) Rhamnus catharticus, L.
(77) Rhamnus frangula.
(78) Robinia pseudacacia, L.
(79) Rhus cotinus, L.
(80) Rhus typhina, L.
(81) Sambucus nigra, S.
(82) Salix alba, L.
(83) Salix caprœa, L.
(84) Salix daphnoides, P.
(85) Salix viminalis, L.
(86) Sophora Japonica, L.
(87) Sorbus aucuparia, L.
(88) Sorbus domestica, L.
(89) Spartium scoparium, L.
(90) Spirœa opulifolia, L.
(91) Syringa vulgaris, L.
(92) Tamarix gallica, L.
(93) Taxus baccata, L.
(94) Tilia parvifolia, E.
(95) Thuja orientalis.
(96) Ulmus campestris.
(97) Ulmus effusa.
(58) Viburnum opulus.
(99) Vitis vinifera.
(100)

2. Twenty-two specimens of woods from California :

(1) White Ash, from Kansas.
(2) Peach.
(3) Castor Bean.
(4) Hickory.
(5) Black Walnut.
(6) Grape.
(7) Pea Bud.
(8) White Ash.
(9) Red Cedar.
(10) Kansas Pecan.
(11) Box Elder.
(12) Honey Locust.
(13) White Oak.
(14) Mulberry.
(15) Kansas Linden.
(16) Red Oak.
(17) Quaceing Ash.
(18) Wild Cherry.
(19) Osage Orange.
(20), (21), (22) Pine Cones.

3. Section of the trunk of an oak.
4. Specimen of Cotton Plant (Gossypium herbaceum).
5. Gum from Australia.
6. Fibrous pod from the West Indies.
7. Herbarium of Canadian plants, in which are represented of Dicotyledons 76 orders, 243 genera, and 454 species; of Monocotyledons 12 orders, 82 genera, and 199 species; of Gymnosperms 1 order, 5 genera, and 5 species; of Cryptogamus 6 orders, 18 genera, and 40 species.
8. Herbarium of British plants.
9. Herbarium of German plants, including examples of 536 species.
10. Collection of agricultural grasses from Ireland, including examples of 25 genera and 48 species.
11. Series of botanical diagrams.
12. Seeds and pod of Catalpa syringœfolia.
13. Seeds of Sapindus saponaria, Soapberry, from W. I.
14. " Coix lacryma, Job's tears, from W. I.
15. " Abrus precatorius, from W. I.
16. " Melia azedarach, from W. I.

II.—*Zoological Sub-section.*

1. Thirteen casts illustrative of anatomy of human body.
2. Red Kangaroo, *Macropus laniger.*
3. Walabee Kangaroo, *Macropus ualabatus.*

CATALOGUE OF MUSEUM—*Continued.*

4. Emeu.
5. Collection of 25 birds' nests and eggs.
6. *Alligator Mississippiensis.*
7. Bones of Green Turtle, *Chelone midas.*
8. Carapace of Green Turtle, *Chelone midas*—2 specimens.
9. Milk-snake, *Ophibolus doliatus.*
10. Ring Snake, *Ophibolus getulus.*
11. Ring-necked Snake, *Diadophis punctatus.*
12. Little Green Snake, *Cyclophis vernatus.*
13. Green Frog, *Rana halecina.*
14. Common Toad, *Bufo vulgaris.*
15. Hermit Crab, *Eupagurus sp. ?*
16. King Crab, *Limulus polyphemus.*
17. Acorn Barnacle, *Balanus sp. ?*
18. Specimen of *Polyzoon.*
19. Sea Squid, *Loligo Pealii.*
20. Small collection of marine shells.
21. Sea Worm, *Nereeis sp. ?*
22. " Gen. et sp. (?)
23. Common Star-fish, *Asteracanthion.*
24. Star-fish from W. I., *Oreaster sp. ?*
25. Star-fish, *Brisinga sp. ?*
26. Sea Urchins, *Strongylocentrotus sp. ?*
27. Sand Dollars, *Echinarachnius parma.*
28. Brittle Stars, *Ophiolepis sp. ?*
29. Brittle Stars, *Ophiocomis sp. ?*
30. Jelly Fish.
31. White Coral, *Madrepora sp. ?*
32. Sea Anemone.
33. *Gorgonia sp. ?*
34. Venus' Fan, *Rhipidogorgia sp. ?*
35. Sponges, 3 varieties.
36. Series of zoological plates.
37. Series of Patterson's Zoological Diagrams.
38. Portion of Series of Marshall's Physiological Diagrams.
39. " Johnston's Illustrations of Natural Philosophy.

III.—*Entomological Sub-section.*

1. Four cases of insects.
2. Five cases of insects, presented by Mr. A. Nicol.
3. Silk from common silk worm, *Bombyx mori.*
4. Cocoons of common silk worm, *Bombyx mori.*
5. Cocoons of Canadian silk worm, *Cecropia.*
6. A few Lepidopterous larvæ.
7. A few Lepidopterous eggs.
8. Series of Entomological diagrams.

D—Geological Section.

I.—*Mineralogical Sub-section.*

1. Gold in quartz. California.
2. Gold nugget. El Dorado, California.
3. Silver. Freiburg, Saxony.

CATALOGUE OF MUSEUM—*Continued.*

4. Copper. Franklin Mine, Lake Superior.
5. Meteoric Iron. Bates County, Missouri.
6. Sulphur. Girgenti, Sicily.
7. Diamond. Kimberley Mine, South Africa.
8. Graphite. Ceylon.
9. Stibnite. Sarawak, Borneo.
10. Galenite. Cumberland, England.
11. Galenite. Galena, Illinois.
12. Sphalerite. Cumberland, England.
13. Sphalerite. Roxbury, Connecticut.
14. Cinnabar. New Almaden, California.
15. Pyrites. Isle of Elba.
16. Pyrites. Rowe, Massachusetts.
17. Cobaltite. Tunaberg, Sweden.
18. Marcasite. Folkestone, England.
19. Arsenopyrite. Freiberg, Saxony.
20. Molybdenite. Altenberg, Saxony.
21. Chalcopyrite. Gippsland, Victoria, Australia.
22. Halite. Stassfurt, Prussia.
23. Halite. Austria.
24. Sal-ammoniac in lava. Vesuvius.
25. Fluorite. Cumberland, England.
26. Fluorite. Cumberland, England.
27. Cryolite. Arksutfiord, Greenland.
28. Spinel. Amity, New York.
29. Magnetite. Port Henry, New York.
30. Magnetite, var. loadstone. Magnet Cave, Ark.
31. Chromite. Baltimore, Maryland.
32. Zincite. Franklin Furnace, New Jersey.
33. Corundum. North Carolina.
34. Corundum, var. emery. Naxos, Greece.
35. Hæmatite, var. specular iron ore. Elba.
36. Hæmatite, var. micaceous. Pennsylvania.
37. Hæmatite. Cleator Moor, Cumberland, Eng.
38. Hæmatite. Antwerp, New York.
39. Menaccanite. Cumberland, Rhode Island.
40. Cassiterite. Zinnwald, Saxony.
41. Rutile. Krageroë, Norway.
42. Pyrolusite. Langeberg, Saxony.
43. Limonite. Lake Superior.
44. Limonite, var. ochre. Cape Girardeau, Mo.
45. Brucite. Texas, Pennsylvania.
46. Hydrotalcite. Vernon, New Jersey.
47. Psilonielane. Langenstriegis, Saxony.
48. Quartz. Warstein, Westphalia.
49. Quartz. Rondout, New York.
50. Quartz, var. geode. Keokuk, Iowa.
51. Quartz, var. rock crystal. Little Falls, New York.
52. Quartz, var. rock crystal. Hot Springs, Arkansas.
53. Quartz, var. amethystine. Cumberland, England.
54. Quartz, var. milky quartz. Bedford, New York.
55. Quartz, var. rose quartz, Bedford, New York.
56. Quartz, var. amethyst. Lake Superior.

CATALOGUE OF MUSEUM—*Continued.*

57. Quartz, var. smoky quartz. Bedford, New York.
58. Quartz, var. chalcedony. Tampa Bay, Florida.
59. Quartz, var. chalcedony. Brazil.
60. Quartz, var. agate. Brazil.
61. Quartz, var. flint. Dover, England.
62. Quartz, var. jasper. Cambay, England.
63. Quartz.
64. Quartz, var. itacolumite. Danbury, North Carolina.
65. Quartz, var. silicified wood. Cairo, Egypt.
66. Opal. Hungary.
67. Opal, var. wood opal. Nevada, California.
68. Opal, var. Tripoli. Algeria.
69. Wollastonite. Amity, New York.
70. Pyroxene. Puy de la Rhode, Auvergne.
71. Jeffersite. Pennsylvania.
72. Amphibole. Chester, Massachusetts.
73. Amphibole, var. actinolite. Cranston, Rhode Island.
74. Amphibole, var. tremolite. Gouverneur, New York.
75. Amphibole, var. asbestos.
76. Cloth woven from asbestos.
77, Beryl. Middletown, Connecticut.
78. Chondrotite. Amity, New York.
79. Garnet. Redding, Connecticut.
80. Garnet. Ala, Piedmont.
81. Garnet in mica schist. Southbury, Conn.
82. Zircon. Buncomb Co., North Carolina.
83. Vesuvianite. Vesuvius.
84. Wernerite. Templeton, Canada.
85. Wernerite. Newtown, Connecticut.
86. Epidote. Sulzbachthal, Tyrol.
87. Epidote rock. Afton, Virginia.
88. Muscovite.
89. Muscovite, var. picture mica. Delaware Co. Penn.
90. Margarodite. Trumbull, Pennsylvania.
91. Phlogopite. Jefferson Co., New York.
92. Biotite. Edenville, New York.
93. Lepidolite. Rozena, Moravia.
94. Leucite in lava. Vesuvius.
95. Labradorite. Labrador.
96. Labradorite. Orange Co., New York.
97. Oligoclase. Arendal, Norway.
98. Albite. Pfitsch, Tyrol.
99. Microcline. Buo, near Arendal, Norway.
100. Microcline, var. Amazon stone. Pike's Peak, Cal.
101. Orthoclase. Carlsbad, Germany.
102. Orthoclase.
103. Orthoclase. Wilmot, New Hampshire.
104. Catlinite. Minnesota.
105. Kaolinite. Bedford, Indiana.
106. Indurated clay. Mt. Savage, Maryland.
107. Leopardite. Charlotte, North Carolina.
108. Obsidian. Lipari, Mediterranean.
109. Lava. Vesuvius, Italy.

CATALOGUE OF MUSEUM—*Continued.*

110. Pumice. Lipari, Mediterranean.
111. Andalusite, var. chiastolite. Rochester, N. H.
112. Topaz. Villa Rica, Brazil.
113. Staurolite. Goldenstein, Moravia.
114. Cyanite. Randolph Co., Alabama.
115. Tourmaline. Ramfossen, Norway.
116. Tourmaline. Randolph Co., Alabama.
117. Tourmaline. Alexandra Bay, New York.
118. Talc. Zillerthal, Tyrol.
119. Talc. Fowler, New York.
120. Talc, var. rensslaerite. Fowler, New York.
121. Serpentine. Vernon, New Jersey.
122. Serpentine. Waldstein, Saxony.
123. Serpentine. Harford Co., Maryland.
124. Ripidolite. Chester Co., Pennsylvania.
125. Masonite. Natic, Rhode Island.
126. Chrysocolla. Chanarcilla, Chili.
127. Calamine. Ogdensburg, New York.
128. Halite. Fassathal, Tyrol.
129. Chabazite. Rübendörfel, Bohemia.
130. Natrolite. Aussig, Bohemia.
131. Stilbite. Nova Scotia.
132. Wolframite. Zinnwald, Saxony.
133. Barite. Cumberland, England.
134. Barite. Cocke Co., Tennesee.
135. Barite. Derbyshire, England.
136. Celestine. Sicily.
137. Anhydrite. Nova Scotia.
138. Gypsum, var. selenite. Poland, Ohio.
139. Gypsum, var. selenite. Manlius, N. Y.
140. Gypsum, var. satin spar. Derbyshire, England.
141. Gypsum, var. alabaster. Castelina, Italy.
142. Gypsum. Windsor, Nova Scotia.
143. Apatite. Norway.
144. Apatite. Burgess, Canada.
145. Pyromorphite. Ramsbeck, Germany.
146. Wavellite. Garland Co., Arkansas.
147. Dufreynite. Rockbridge Co., Virginia.
148. Soda nitre. Tarapaca, Peru.
149. Sassolite. Sasso, Tuscany.
150. Calcite. Cornwall, England.
151. Calcite. St. Louis, Missouri.
152. Calcite, var. Iceland spar. Iceland.
153. Calcite, var. statuary marble. Italy.
154. Calcite, var. California marble. Suisan, Cal.
155. Calcite, var. Mexican onyx. Mexico.
156. Calcite, var. calcareous tufa. Niagara Falls.
157. Calcite, var. incrustation. Clermont, France.
158. Dolomite, var. pearl spar. Niagara Falls,
159. Dolomite. Westchester Co. New Jersey.
160. Siderite. Roxbury, Connecticut.
161. Arragonite. Bastenes, France.
162. Strontianite. Drensteinfurt, Prussia.

CATALOGUE OF MUSEUM—*Continued.*

163. Malachite. Burra Burra, Australia.
164. Natron. Natron Lake, Egypt.
165. Succinite. Konigsberg, Prussia.
166. Asphaltum. Trinidad.
167. Petroleum. Jebel Zeit, Egypt.
168. Ozocerite. Barislaw, Galicia.
169. Albertite. New Brunswick.
170. Mineral coal, var. anthracite. Lehigh Valley.
171. Mineral coal, var. native coke. Richmond, Va.
172. Mineral coal, var. cannel coal. Grayson, Ky.
173. Mineral coal, var. lignite. Grumden, Austria.
174. Mineral coal, var. jet. Wurtemburg.

There are also many other specimens as yet unidentified.

II.—*Geological Sub-section.*

Many specimens of rocks as yet unnamed.

III.—*Palæontological Sub-section.*

Many specimens illustrative of the Canadian fossil fauna, and flora as yet, however, unclassified.

E—Physical and Astronomical Section.

1. Smith's 10-inch celestial globe.
2. W. & A. K. Johnstone's 10-inch terrestrial globe.
3. Orrery.
4. Johnston's illustrations of natural philosophy.
5. Diagram of principles of optics.
6. Diagram of principles of hydraulics.
7. Diagram of principles of hydrostatics.

F—Educational Section.

1. French measures of capacity.
2. Series of geographical maps in frame.
3. Series of geographical maps in frame.
4. Series of geographical wall maps.

It is to be regretted that, owing to the short time at my disposal, the catalogue is not as complete as it ought to be, but still sufficient has been given above to afford an idea of the extent of our collections in the various departments, and to show wherein we are yet lacking.

Playfair McMurrich, M.A., Tor.,
Curator of Museum.

PART IV.

REPORT

OF

THE PHYSICIAN.

Ontario Agricultural College,
Guelph, December 19th, 1882.

To the Honorable S. C. Wood,
Commissioner of Agriculture for the Province of Ontario.

Sir,—At the close of another year I have the honour to present to you my Annual Report.

During the earlier months of the year we had a good deal of sickness. We had an epidemic of mumps of a metastatic type, and many of the young men were very ill. During this time quite a few of the young men who were not attacked with the mumps, suffered from an inflammatory condition of the throat. Following this we had scarlet fever of a bad type, which was prevented from spreading by the prompt removal of the young men attacked to the Guelph General Hospital, where they had every care and attention. and where they remained until they could return to the College with perfect safety to the other inmates. One of the scarlet fever patients was afterwards taken ill with albumenuria; but, with proper treatment, and care on his own part, made a good recovery.

We had one case of measles (servant girl), but by careful isolation it was prevented from spreading.

A few weeks ago one of the young men had his thigh broken. He is doing well, and will soon be about.

The last serious case this season is one of erysipelas of the head and face, and I am glad to be able to report him doing well.

There are many other cases I might mention, but they are just such as are met with in every day practice.

We have great reason to be thankful that, notwithstanding the very serious illness of some of the young men, we have not had a death this year.

What we require in connection with this Institution is properly isolated apartments for the sick, where, in case of epidemic, we could remove our patients at once, and thus guard against the spread of disease, and where the sick will be free from the noise and commotion that cannot be avoided in an Institution of this kind.

I have the honour to be, Sir,

Your obedient Servant,

E. W. McGuire.

PART V.

REPORT OF COMMITTEE

CHARGED WITH THE OVERSIGHT OF

FRUIT AND FOREST PLANTING

AT THE

AGRICULTURAL COLLEGE, GUELPH.

GUELPH, November 23d, 1882.

To the Honourable the Commissioner of Agriculture:

SIR,—The Committee of the Fruit Growers' Association, charged with the duty of directing the operations in Horticulture and Forestry at the Agricultural College, Guelph, beg to submit the following report:

The orchard, begun in 1880, and extended in 1881, is in a healthy condition, and the trees are making as rapid growth on the whole as could be desired. It has been the aim of your Committee to make this orchard not only an experimental one, where shall be tested every variety of fruit at all likely to succeed in this climate, but also to grow therein a sufficient quantity of the most valuable varieties to give an ample supply for the use of the College.

APPLES.

There are now growing in the orchard six hundred and seventy apple trees, comprising ninety-two varieties. Those planted in largest quantity are Golden Russet, Roxbury Russet, Rhode Island Greening, Wagener, Northern Spy, Baldwin, Swayzie Pomme Grise, Snow Apple, Ribston Pippin, Talman Sweet, Mann Apple, Duchess of Oldenburg, Gravenstein, St. Lawrence, Alexander, Morton's Melon, Chenango Strawberry, Twenty Ounce, Early Harvest, Red Astracan, Keswie Codlin, etc., and of those more particularly intended as experimental, only two trees of a kind have been planted.

PEAR.

There are ninety-three pear trees now well established, comprising thirty-six varieties. Fifty-three trees were planted temporarily in nursery row, comprising sixteen sorts. These will be planted in the orchard next spring.

PLUMS AND CHERRY.

The portion devoted to plums contains sixty-six trees, comprising twenty-three sorts; and that set apart for cherries contains fifty-one trees, comprising eighteen sorts.

The Vineyard.

We are gratified in being able to say that the grape vines have done remarkably well, and while making a thrifty growth have matured their wood perfectly. There are now growing and well established, five hundred and thirty-six vines, comprising fifty-seven different varieties. These will soon come into bearing, and become an interesting opportunity for study and comparison, while at the same time yielding a supply of agreeable fruit for the College tables.

Small Fruits.

These yielded some fruit during the past summer, and although your Committee thought they had planted liberally of these, having put out over two thousand raspberry plants, and nearly four thousand of strawberry, yet it was found that the requirements of the College were far from being met. In addition to the raspberry and strawberry plantation there are three hundred and twenty-three gooseberry, and two hundred and twelve currant trees growing. These comprise twenty-one varieties of raspberry, thirteen of strawberry, three of gooseberry and four of currants.

Forestry.

The several clumps of Black Walnut, European Larch, Butternut, Sugar Maple and of mixed trees are doing fairly well, except that the group of Larch from some cause did not succeed, probably owing to the very dry character of the soil in which they were planted. There is, however, a sufficient number of young Larches in the nursery plot to supply all the vacancies. It was found desirable to use the field in which the clump of Ash had been planted as an experimental grain plot. On this account they have been taken up and will be set out in the other field next spring. The experiment of growing black Walnut, with and without cultivation, is already demonstrating the fact that the growth is much more satisfactory where clean cultivation with occasional stiring of the soil is practised. The nursery plantations of young trees will supply a considerable portion of the trees required for the proposed enlargement of existing clumps, and by keeping up a constant succession of nursery planting, the required trees for forestry purposes can be always at hand in the best possible condition for transplanting.

The Arboretum.

In attempting to extend the arboretum the Committee found that it was absolutely necessary to rearrange the front grounds, and to provide some definite and well arranged plan that harmonized with the grounds and buildings on which to base all future work. Hitherto no such plan had been prepared, hence it was impossible to proceed systematically with the extension of the arboretum in a manner that would subserve the purposes of education, and at the same time adorn the grounds and produce the proper landscape effect. After some correspondence we were so fortunate as to secure the services of the most eminent landscape gardener in America, Mr. Chas. B. Miller, of Fairmount Park, Philadelphia. He visited the College in April last and examined the grounds thoroughly in company with yourself, the Committee and the architect. He has now prepared and placed in our hands a most admirable plan of all of that part of the grounds; this plan has been approved by yourself, and when the planting and grading shall have been completed in accordance therewith, we believe that the College grounds around and in front of the buildings will be all that can be desired. Work has been already begun and the grounds immediately in front of the main building laid out in conformity with the plan, and the requisite carriage-ways to the recently erected residences of the Professor of Agriculture and of the Bursar provided. Already a great improvement in the appearance of the grounds is manifest, a pleasing foreshadowing of the results to be achieved when the whole work is once completed, and time enough shall have elapsed to produce the growth necessary to give the effect to the whole. Ample space is now set apart for the planting of an extensive arboretum, which your Committee intend shall be grouped in such a manner as to be convenient for study by the young men, and serve as illustrations in teaching, and at the same time these groups will be so placed as to give the best land-

scape effect. The new buildings, including those which have been erected this summer, and those which are contemplated in the future, have been located upon the plan with a view to the general effect of the whole when they are completed. The buildings yet to be erected, and which are already very much needed, are the conservatory and propagating houses, with lecture-room attached, a chemical laboratory for teaching analyses of soils, manures, etc., and the head gardener's residence. It is to be sincerely hoped that the Legislature will grant at its coming session the funds that may be needed to erect these buildings, the lack of which greatly cripples the effectual working of the chemical and horticultural departments.

The Seed Beds.

With a view to giving a supply of young trees for future planting, and to afford at the same time instruction in the raising of forest trees from seed, a number of beds were prepared and sown with tree seeds. As was to be expected, some of these seeds failed to germinate the first season, and after lying dormant in the ground for a whole year, came up in the second spring. From these beds a goodly number of some varieties of trees and shrubs will be obtained. Some of the kinds sown have apparently failed altogether, thus affording lessons to the student from failure as well as success.

Future Operations.

We have made arrangements with the Professor of Agriculture for a half acre block in the experimental field, which it is our intention to surround with a hedge formed of a variety of hedge plants, for the purpose of showing a sample of hedge formed from each. This will afford both students and visitors an opportunity of seeing the results produced by each plant when trimmed close and grown as a hedge, and test the adaptability of each for hedging purposes. The enclosed plot will be devoted to nursery beds for the growing of young trees taken from the seed beds or procured by purchase, until they have attained sufficient size to be removed to permanent situations. It is also intended to set out in the spring two or three aditional clumps of forest trees, one of White Ash, one of American Elm, one of mixed evergreens, also to complete the group of European Larch, and extend that of Sugar Maple.

In the orchard all vacancies will be filled up, and the acre of ground recently purchased planted out so as to complete that portion; and such other varieties added as may be desirable for the purpose of testing their adaptation to our climate. Some additions will also be made to the plantation of gooseberries, currants, raspberries and strawberries in order to furnish a sufficient supply, of these fruits for the use of the College, a large part of which will be taken from the existing plantations, particularly of raspberry and strawberry. Some new varieties of these fruits, and of grapes, will also be set out in the spring, together with a few mulberries, so that the work of testing these may keep pace with the progress of horticulture elsewhere.

In conclusion your Committee would say that such progress has been made in the departments of fruit culture and forestry during the short time that has elapsed since you confided these to our direction as we trust will be satisfactory to you, both in the amount of work done, and in the economical manner in which it has been accomplished. In a work of this kind great results cannot be achieved in a single season, yet, even now some fruit is being gathered, some improvements, we think, are to be seen, and these, we believe, will increase in progressive ratio as the years roll by, until the results shall be seen in an abundant supply of fruits of all kinds suited to the climate, sufficient to meet all the wants of the College, both for consumption and comparison; and groves of trees, and groups of specimens of every variety of tree and shrub shall give beauty to the landscape, and afford means of instruction in all that a well-informed yeoman can wish to know of the character and uses of the forest products of his native land.

In behalf of the Committee,

D. W. Beadle,

Secretary.

The nine following pages of Class Lists should have followed p. 87, Appendix 4, Part I., but they were inadvertently left out of their proper place.

Class Lists: Easter, 1882.

SECOND YEAR—*Continued.*

Classes.	Hippopathology.	Handling and Judging of Horses.	English Literature.	English Composition.	Political Economy.
Honours. I.	1 Howitt 2 Wettlaufer 3 Ramsay 5 Shuttleworth 4 Chase 6 Blanchard	1 Howitt 2 Shuttleworth 3 Stover 4 Blanchard	1 Howitt 2 Barclay 3 Philbin	1 Barclay 2 Howitt	1 Howitt .....
Honours. II.	1 Williams 2 Stover 3 Philbin 4 Barclay 5 Gilpin 6 Bowman 7 Dennis 8 Bethune 12 Shearer Bignell 13 White, W G 10 Silverthorne 14 Duthie 11 White, C. D. Elworthy	1 Ramsay 2 Wettlaufer 3 Dennis 4 Silverthorne 5 Barclay 6 Philbin 7 Bethune 8 Williams 9 Duthie 10 Chase	1 Hallesy 2 Stover / Wettlaufer 4 Ramsay 5 Silverthorne 6 Bowman 7 Chase 8 Bethune 9 Shuttleworth 10 White, C. D. 11 Dennis 12 White, W. G.	1 Shuttleworth 2 White, W. G. 3 Philbin 4 Elworthy 5 Wettlaufer 6 Ramsay 7 Stover	1 Wettlaufer 2 Shuttleworth 3 Philbin 4 Ramsay 5 Stover 6 Bignell 7 Chase ....
Pass. III.	1 Pope, E. / Dawson / Mahony / Hallesy 5 Goold	1 Elworthy 2 Shearer 3 Mahony 4 White, W. G. 5 Bowman / Bignell / Gilpin 8 Pope, E. 9 Dawson 10 Hallesy White, C. D. Goold	1 Bignell 2 Dawson 3 Mahony 4 Elworthy 5 Duthie 6 Shearer / Tronson Gilpin Williams Goold Blanchard Pope, E.	1 Dennis 2 Blanchard 3 Hallesy 4 Elworthy 5 Chase 6 Dawson 7 White, C. D. 8 Mahony 9 Bowman 10 Silverthorne 11 Bethune 12 Shearer Goold Duthie Williams Pope, E. Gilpin	1 Hallesy 2 Silverthorne 3 Bethune 4 Dennis 5 Gilpin 6 Elworthy 7 Dawson 8 Bowman 9 Mahony 10 Williams 11 White, C. D. 12 Shearer Blanchard Goold White, W. G. Pope, E. Duthie Barclay .....

☞ Names unnumbered are those of Students who have failed to pass in the subject.
The minimum for first class honours is 75 per cent.; for second class honours, 50 per cent.; for pass, 33 per cent.

Class Lists: Easter, 1882.

SECOND YEAR—*Continued.*

Classes.		Statics.	Draining and Levelling.	General Proficiency.
Honours.	I.	1 Howitt 1 Wettlaufer	1 Howitt 1 Chase 3 Ramsay 4 Wettlaufer 4 Shuttleworth 6 Williams 6 Bignell 8 Dawson	1 Howitt, W. 2 Wettlaufer, F. 3 Shuttleworth 4 Ramsay, R. A.
	II.	1 Blanchard 2 Shuttleworth 3 Stover 4 Ramsay 5 Elworthy 6 Dennis 7 Bethune 7 Gilpin	1 Silverthorne 2 Dennis 3 White, W. G. 4 Hallesy 5 Bowman 5 Barclay 7 Duthie 7 Mahony 9 Bethune 9 Elworthy	1 Stover, W. J. 2 Chase, O. 3 Dennis, J.
Pass.	III.	1 Chase 1 Dawson 3 Philbin 4 Bowman 5 Duthie 6 Hallesy 7 Williams 8 Mahony White, W. G. Goold White, C. D. Tronson Silverthorne Barclay Bignell Shearer	1 Stover 2 Shearer 3 Philbin 3 Gilpin 5 White, C. D. 6 Blanchard Goold Pope, E.	1 Bethune, K. 2 Dawson, J. 3 Mahony, E. C.

Departments.		First-class Men in the Departments.
I.	Agriculture.	1 Howitt, W. 2 Wettlaufer, F. 3 Shuttleworth, A.
II.	Natural Science.	1 Howitt, W.
III.	Veterinary Science.	1 Howitt, W. 2 Wettlaufer, F. 3 Ramsay, R. A. 4 Shuttleworth, A. 5 Blanchard, M. G.
IV.	English Literature and Political Economy	1 Howitt, W.
V.	Mathematics.	1 Howitt, W. 2 Wettlaufer, F.

☞ Names unnumbered are those of Students who have failed to pass in the subject.
Only those who pass in every subject are ranked in general proficiency.
First-class men in general proficiency must obtain at least 67 per cent. of the total number of marks; second-class men, at least 50 per cent. of the total number of marks. First-class men in any department must obtain at least 75 per cent. of the marks allotted to the subjects in that department.

CLASS LISTS.—*Continued.*

II.—*Midsummer Examinations, 1882.*

FIRST YEAR.

Classes.	Agriculture.	Geology.	Botany.	Meteria Medica.	English Literature.
I.	1 Hutton, J. R. 1 Jeffs, H. B. 3 Creelman, J. A.	1 Hutton, J. R. 2 Robertson 3 Donaldson 4 Stevenson	1 Gregory 2 Slater 3 Hutton, J. R. 4 Willis	1 Robertson 1 Jeffs 3 McNish 3 Santon 5 Slater 5 Neilson 7 Maunsell 7 Homfray 9 Tucker 9 Hutton, J. R. 9 Willis 12 Smith, Lloyd 12 Fotheringham 14 McPherson	1 Hutton, J. R. 2 Slater 3 Willis .....
Honours. II.	1 Robertson, W. 2 Willis, W. B. 3 Bowes, J. B. 3 Santon, E. A. 5 Fotheringham, W. 6 Hutton, W. E. 7 McPherson, D. 7 Maunsell 7 McNish, C. H. 10 Stevenson, C. R. 11 Harrison, H. O. 12 Major, C. H. F. 12 Kistell, R. H. 14 Mathewson, G. 14 Edmondson, J. A. 16 McLennan, J. D. 17 Donaldson, J. 17 Garland, C. S. 17 Slater, H. 20 Paton, G. C. 21 Neilson, J. 22 Strange, A. W. 22 Boyle, R. (vise) 22 Holcroft, H. S. 22 Greenlaw, F. W.	1 Slater 2 Fotheringham 3 Gregory 4 Austin 5 McPherson 6 Jeffs 6 Neilson 8 Willis 9 Strange 10 Maunsell 11 Garland 11 Santon 13 Joseph	1 Stevenson 2 Jeffs 3 Major 4 Maunsell 5 Donaldson 6 Saxton 7 Paton 8 Joseph 8 Strange 8 Holcroft 11 McPherson 12 Holcroft 12 Robertson 14 Hanson	1 Joseph 2 Edmondson 3 Garland 3 Harrison 5 Ord 6 Rose 7 Edgar 7 Strange 9 Major 9 Weston 9 Gregory 9 Holcroft 9 Donaldson 14 Luton 14 Schwartz 14 Hutton, W. E. 17 Whitehead 18 Bowes 18 Gillespie 20 Greenlaw 21 Torangeau 21 McMartin, A. 23 Stevenson 23 Mathewson 23 Creelman 26 Boyle, R. 27 Eddington 28 Paton 28 Aylsworth 28 Boyle, H. 31 Cowley	1 Joseph 2 Robertson 3 Donaldson 4 Eddington 5 Major 6 Stevenson 7 Tucker 8 Fotheringham 9 Mathewson 9 Paton 11 Boyle, R. 12 Hanson 13 Harrison 14 McPherson 15 Creelman 15 Garland 17 Gregory 17 Homfray 19 Jeffs 19 Strange 21 Greenlaw 21 Raynes 23 DeWinton ....

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Pass. III.

1 Tourangeau, A.	1 Rose	1 McNish	1 Morton	1 Neilson
1 DeWinton, F. W.	2 Major	1 Bowes	2 Fuller	2 Maunsell
1 Joseph, S. S.	3 Schwartz	1 Fotheringham	3 Buckingham	3 Austin
4 Gillespie, J. H.	4 Homfray	4 Garland	4 DeWinton	4 Edgar
4 Smith, J. L.	5 Paton	5 Schwartz	5 Carnegie	5 Schwartz
6 Raynes, G. S.	6 Creelman	6 Smith, J. Lloyd	6 McLennan	6 Broughton
7 Edgar, A. E.	6 McNish	7 Greenland	7 Jones Williams	7 Tourangeau
7 Rose, G. M.	8 Holcroft	7 Ord	8 Hanson	8 Bowes, J. B.
9 Hanson, E. F.	9 Smith	9 Mathewson		9 Edmondson
9 Carnagie, J. H.	10 Edmondson	9 Neilson	Lattimore	10 Smith, J. L.
9 Austin, W. E.	10 Tucker	11 Tucker	McLennan, A.	11 Buckingham
9 Cutting, A. H.	12 Tourangeau	12 Eddington	Rhodes	12 Holcroft
9 Morton, F. G.	12 Harrison	13 Creelman	Pinkey	13 Carnegie
14 Boyle, R.	14 Hanson	13 Harrison	Ings	14 Jones Williams
15 Fuller, S. G.	15 Luton	15 Edmondson	.....	15 Rose
15 Eddington, D. C.	15 Bowes, J. B.	.....	.....	16 McNish
17 Luton, E.	17 Raynes	Morton	.....	16 Aylsworth
18 Buckingham, F. W.	17 Weston	Luton	.....	18 Ord
18 Homfray, P.	17 Boyle (Lord)	Tourangeau	.....	18 Whitehead
	17 Mathewson	Raynes	.....	
Aylesworth, H.	21 Morton	McLennan, D.	.....	Morton
Cowley, E. A. E.		Doyle	.....	Luton
Gregory, J.	Boyle, H.	Gillespie	.....	Boyle, H.
Lattimer, R.	Eddington	DeWinton	.....	McMartin
McMartin, Alex.	Cowley	Whitehead	.....	Pinkey
McLennan, A.	DeWinton	Fuller	.....	Fuller
Pinkey, H. R.	Greenlaw	Edgar	.....	Cowley
Rhodes, O.	Jones, Williams	McLennan, A.	.....	Gillespie
Schwartz, J.	Carnegie	Pinkey	.....	McLennan, A.
Tucker, H. V.	Fuller	Carnegie	.....	Weston
Whitehead, J.	McLennan, A.	Lattimer	.....	McLennan, J. D.
Weston, G. H.	Edgar	Cutting	.....	Cutting
Jones, Williams A.	Rhodes	Boyle, H.	.....	Lattimore
.....	Buckingham	McMartin	.....	McLennan, D.
.....	Lattimer	Hutton, W. E.	.....	Rhodes
.....	Gillespie	Weston	.....	Hutton, W. E.
.....	McMartin	Rose	.....	Ings
.....	Pinkey	Cowley	.....	.....
.....	McLennan, J. D.	Ings	.....	.....
.....	Hutton, W. E. Ings	Austin	.....	.....
.....	Aylsworth Whitehead	.....	.....	.....
.....	Broughton Cutting	.....	.....	.....

☞ Names unnumbered are those of Students who failed to pass in the subject.

The minimum for first-class honours is 75 per cent.; for second-class honours, 50 per cent.; for pass, 33 per cent.

Class Lists: Midsummer, 1882.

FIRST YEAR.—*Continued.*

Classes.	English Composition.	Mensuration.	General Proficiency.	Departments.	First-class Men in the Departments.
Honours. I.	1 Slater 2 Hutton, J. R. 3 Major 4 Donaldson 5 Paton 6 Boyle (Viscount)	1 Slater	1 Hutton 2 Slater 3 Fotheringham 4 Willis	I. Agriculture.	1 Hutton, J. R. Jeffs 3 Creelman
Honours. II.	1 Gregory 2 Stevenson 3 Harrison 4 Greenlaw 5 Joseph 6 Creelman 7 Homfray 8 Robertson 9 Mathewson 10 Hawson 11 Frothingham 12 Buckingham	1 Hutton, J. R. 2 Jeffs 3 Whitehead 4 Hanson	1 Jeffs 2 Donaldson 3 Stevenson 4 Joseph 5 Saxton 6 McPherson 7 McNish 8 Creelman 9 Harrison 10 Paton 11 Gregory 12 Homfray, Neilson, Strange		
	1 McNish, Saxton 3 Eddington 4 Tucker 5 Cowley 6 Strange 7 Jeffs 8 Rose 9 McPherson 10 Broughton 12 DeWinton, Holcroft 13 Schwartz 14 Maunsell 15 Morton 16 McMartin	1 McVish 2 Willis 3 Creelman 4 Boyle, R. 5 Gregory, Harrison 7 Robertson 8 Joseph 9 Donaldson, Hutton, W. E. 11 Stevenson 12 Strange, Homfray 14 McLennan, D. 15 Paton, Sauton	1 Bowes 2 Hanson	II. Natural Science.	1 Hutton, J. R. 2 Slater 3 Gregory

Pass.					
III.	17 Tourangeau	17 { Rose McPherson			
	18 { Bows, J. B. Cutting	Gillespie			
	20 { Luton Neilson	20 Greenlaw 21 Bowes			
	Smith, J. L.	22 Neilson			
	Rhodes	23 Fotheringham			
	Edgar	Garland			
	Garland	Maunsell	III.	Veterinary Materia Medica.	3 { Robertson Jeffs McNish
	Jones, Williams	DeWinton			5 { Saxton Slater
	Aylsworth	Eddington			7 { Neilson Maunsell
	McLennan, J. D.	Saxton			9 { Homfray Hutton
	Austin	Edmondson			12 { Willis Smith, J. L.
	Fuller	Luton			13 { Fotheringham McPherson
	Weston	McMartin			
	Pinkey	Smith, J. L.			
	McLennan, A.	Boyle, H.			
	Latimer	Broughton			
	Whitehead	Carnegie			
	Carnegie	Pinkey			
	Gillespie	Aylsworth			
	Boyle, H	Morton			
	Ings (sick)	Mathewson			
	.....	Buckingham			
	.....	Austin			
	.....	Cowley			
	.....	Edgar			
	.....	Fuller			
	.....	Holcroft			
	.....	Jones, Williams			1 Hutton, J. R.
	.....	Latimer	IV.	English Literature and Composition.	2 Slater
	.....	Major			3 Willis
	.....	McLennan, A.			
	.....	McLennan, J. D.			
	.....	Ord			
	.....	Raynes			
	.....	Rhodes			
	.....	Tourangeau			
	.....	Tucker			
	.....	Weston	V.	Mathematics.	1 Slater
	.....	Cutting			
	.....	Ings (sick)			

☞ Names unnumbered are those of students who have failed to pass in the subjects.
The minimum for first-class honours is 75 per cent.; for second-class honours is 50 per cent.; for pass, 33 per cent.
Only those who pass in every subject are ranked in General Proficiency.

Class Lists : Midsummer, 1882.

SECOND YEAR.

Honours.

Classes.	Agriculture.	Live Stock.	Judging Cattle and Sheep.	Practical and Analytical Chemistry.	Systematic and Economic Botany.
I.	1 Shuttleworth, A. 1 Wettlaufer, F. 3 Ramsay, R. A.	1 Shuttleworth 2 Wettlaufer 2 Ramsay 4 Chase	1 Ramsay 2 Shuttleworth 3 Chase	1 Wettlaufer 2 Shuttleworth 3 Torrance	1 Wettlaufer
II.	1 Chase, O. 2 Torrance, W. J. 3 Silverthorne, N. 4 Mahony, E. C. 5 Dickinson, G. A. 6 Perry, D. E. 7 White, C. D. 8 Dawson, J. J.	1 White, C. D. 2 Gilpin 3 Silverthorne 4 Dawson 4 Perry 6 Newport 7 Torrance 8 Hallesy 8 Clark 10 McDonald 11 DeVeber 12 Dickinson	1 Torrance 2 Wettlaufer 3 White, C. D. 4 Shearer 5 Perry 6 Clark, C. 7 Silverthorne 8 Mahony 9 Hallesy 10 Elworthy 11 McDonald 12 Gilpin 13 McPhail 14 Dawson 15 Thomas 16 Dickinson	1 Thomas 2 Ramsay 3 Perry	1 Chase 2 Thomas 3 Ramsay 4 Elworthy 5 White, C. D. 5 Perry 7 Shuttleworth
III.	1 McDonald, J. 2 McPhail, E. 3 Smith, J. A. 4 Shearer, E. S. 5 Clark, C. 5 Newport, E. F. 5 Elworthy, R. H. 8 Hallesy, F. 9 Gilpin, W. 10 McKim, J. 11 DeVeber, W. H. 12 Thomas, F. J.	1 Thomas 2 Elworthy 3 Shearer 4 McPhail 5 Smith, J. A. 6 Mahony 7 McKim	1 DeVeber 2 McKim 3 Smith, J. A. 4 Newport	1 Hallesy 2 Dawson 3 Dickinson 4 Silverthorne 5 Chase 6 White 7 Mahony 8 Clark 9 Elworthy 10 Dennis 10 De Veber McPhail Smith, J. A. Shearer McDonald Newport McKim Gilpin	1 Clark 2 Silverthorne 3 Dickinson 4 DeVeber 6 Hallesy 5 Mahony 7 Torrance 8 Shearer 9 Dawson McKim McDonald Smith, J. A. McPhail Gilpin Newport

☞ Names unnumbered are those of Students who failed to pass in the subjects.
The minimum for first-class honours is 75 per cent.; for second-class honours, 50 per cent.; for pass, 33 per cent.

Class Lists: Midsummer, 1882.

SECOND YEAR—*Continued.*

Classes.		Horticulture.	Materia Medica.	Judging Horses.	English Literature.	Book-keeping.
Honours.	I.	1 Wettlaufer 2 Shuttleworth	1 Wettlaufer 2 Torrance 3 Ramsay 4 Silverthorne	1 Wettlaufer 2 Shuttleworth	1 Thomas 2 Wettlaufer	1 Chase 2 Wettlaufer 3 Shuttleworth 4 Ramsay
	II.	1 Ramsay 2 Chase 3 Thomas 4 Hallesy 5 Dickinson 6 Perry	1 Dawson 2 Hallesy 3 Mahony 4 Thomas 5 Clark 6 Smith 7 Chase 8 White 9 Gilpin 10 Shuttleworth	1 Ramsay 2 Mahony 3 Chase 4 Elworthy 5 Silverthorne 6 Gilpin 7 Hallesy 8 Dawson	1 Shuttleworth 2 Ramsay 3 Chase 4 Dawson	1 Mahony 2 Perry 3 Silverthorne 4 Elworthy 5 Torrance 6 Dawson 7 McDonald
Pass.	III.	1 DeVeber 2 Mahony 3 Elworthy, McDonald 5 Dawson 6 White, C. D. 7 Shearer 8 Silverthorne, Clark, Torrance 11 McKim 12 McPhail 13 Dennis Smith, J. A. Newport Gilpin	1 DeVeber 2 Dickinson 3 Perry 4 Shearer 5 McKim, Elworthy McPhail McDonald Newport	1 White 2 McPhail 3 Shearer	1 Torrance 2 Elworthy 3 Silverthorne 4 DeVeber, Hallesy 6 Perry 7 Clark, Mahony Shearer White, C. Newport McKim Dickinson Smith, J. A. McDonald McPhail Gilpin	1 McKim 2 Shearer 3 Hallesy 4 Dickinson 5 White 6 McPhail 7 Clark 8 DeVeber 9 Smith 10 Thomas 11 Gilpin 12 Newport

☞ Names unnumbered are those of Students who failed to pass in the subject.

The minimum for first-class honours is 75 per cent.; if or second-class honours 50 per cent.; for pass 33 per cent.

Class Lists: Midsummer, 1882.

SECOND YEAR—*Continued.*

Classes.		Land Surveying.	General Proficiency.	Departments.		First-class Men in each Department.
Honours.	I.	1 Shuttleworth 2 Chase 3 Wettlaufer	1 Wettlaufer	I.	Agriculture.	1 Shuttleworth 2 Wettlaufer 3 Ramsay 4 Chase
	II.	1 Ramsay 2 McKim 3 McPhail 4 Perry 5 DeVeber 6 Dawson 7 Dickinson 8 Thomas 9 Gilpin 10 Silverthorne 11 Hallesy 12 White	1 Shuttleworth 2 Ramsay 3 Chase 4 Silverthorne 5 Dawson 6 Mahony	II.	Natural Science.	1 Wettlaufer
				III.	Veterinary Science.	1 Wettlaufer 2 Ramsay
Pass.	III.	1 Smith 2 Torrance 3 Shearer 4 Mahony 5 Clark 6 Elworthy 7 McDonald 8 Newport	1 Hallesy 2 White 3 Elworthy 4 Shearer 5 McPhail 6 Gilpin	IV.	English Literature.	1 Thomas 2 Wettlaufer
				V.	Mathematics & Book-keeping.	1 Chase 2 Shuttleworth 3 Wettlaufer

☞ Only those who pass in every subject are ranked in General Proficiency.
First-class men in General Proficiency must obtain 67 per cent. of the total number of marks; Second-class men, 50 per cent.
First-class men in any department must obtain 75 per cent. of the marks allotted to the subjects in that department.

PART VI.

REPORT

OF THE

PROFESSOR OF AGRICULTURE,

FARM MANAGER AND EXPERIMENTAL SUPERINTENDENT.

Ontario Agricultural College and Experimental Farm,
Guelph, 31st December, 1882.

To the Honourable S. C. Wood,
Commissioner of Agriculture:

Sir,—On entering the eighth year of my work here, I feel it is due to the institution and all its connections, to submit a critical review of the farm cropping, from a conjoint practical and scientific standpoint. A good deal of this kind of reporting has been done by me with reference to live stock in recent communications, and while, in the view of many, cattle and sheep now-a-days are leading the agricultural world, it would be very unwise to overlook what, in our provincial conditions, is still an absolute essential to live stock success.

I ask for a scientific association in this matter for two good reasons: First, because our profession here is to teach it, and, second, that all advanced farming is willing to take lessons from any reasonable and non-technical presentation of the question.

Allow me to term this chapter the science of our agricultural practice, not the practice that is supposed to have been taught by science, for no one could possibly become a farmer in practice by applying any amount of scientific knowledge. It is as true in ours as in other professions, that scientific men learn from practical farmers the very sciences which they themselves practice—in no other way could science be applied to farm practice, I think.

I am prepared to receive the query that may be put—and would be reasonable from many men—is it possible that one individual is able to so blend his practice with science, that others may safely take a lesson? In answer to this, I take great pleasure in assuring our European and American friends, that not only are very many Ontario farmers well read in scientific matters relating to their business, but regularly and systematically carry out a course of cropping based upon light thus obtained, procured also by practical test through their own repeated experiments. This statement is possibly new to even some of our leaders of thought in rural economy, as indeed it may be to some of the very actors themselves. As a twelve years settler of this country, with previous experience akin to what Ontario has given me, I make the assertion, free of all influence, that the average intelligence of our farmers is equal to the same thing in Britain; they are intellectually brighter—in very many cases too bright—they read more; they have been obliged to think more, and act independently, so thus they now stand upon a higher agricultural platform than their professional brothers in England, Ireland, and Scotland, according to the *physical influences* of the respective countries. I could name hundreds of farmers in Ontario who, had they practice in the power of expressing themselves as required when

the story of science in farm practice requires telling, would astonish even a Liebeg and a Lawes.

Our farm of 550 acres has now 400 under cultivation. Since 1876 the mode of cultivation has been a seven shift, based upon getting up dirty and comparatively impoverished land, but yet land of good texture, and of all characters from clay loam down to gravel. Every root division, systematically every year, received a very large amount of farm-yard manure and special fertilizers, so that the whole farm has been gone over in this manner. During that period the average annual produce per acre was 30 bushels peas, 32 bushels barley, 18 bushels spring wheat, 35 bushels fall wheat, 45 bushels oats, 800 bushels mangolds, 650 bushels turnips, 600 bushels carrots, 180 bushels potatoes, and one and four fifths ton of hay, with an average of one and three-fourths ton of straw of all sorts.

Now what is implied in this mean annual produce of 13,580 lbs. per acre from a complete circle of crops under such conditions as have been named? Am I prepared to show all the scientific and practical bearings of such an issue through all the stages of seasons, cultivation, fertilizing, and grazing? I do not hesitate in answering, I am not, nor possibly could any other man have done so.

Well, in this case, wherein lies the exact lesson to the student and the country? No doubt we have yearly sketched the management of each field, and tried to account for results in the usual common-place way, but more is incumbent at the end of the first complete rotation.

How much of the soil of every field was active, and how much dormant at the beginning, and at the end of the period? No chemical analysis at any stage would have helped either the farmer or the scientist to check the *available* amount of plant food, because no chemical knowledge can distinguish between active and dormant matter.

Were the modes of cultivation and fertilizing the right kind to develop any inactivity or deadness, and did we know each year just how much to do in accordance with this physical condition of soils, so as to economise both labour and additional food supply? I doubt it very much.

Particularly, by what were we guided then in applying per acre fifteen loads of farm yard manure, one hundred and fifty pounds of mineral superphosphate, one hundred and fifty of gypsum, two hundred of bone dust, and three hundred and fifty pounds of salt? The argument has been that, not knowing what might be needed for the six suceeeding crops after the root one—with which these fertilizers were always introduced to the course—it was best to provide plenty in view of all demands. Can this be called enlightened scientific practice in these days? Very doubtful, indeed.

What has become of the thirty tons of mineral superphosphate, thirty tons gypsum, forty tons bone dust, eighty tons salt, and six thousand tons of farm-yard manure, that cost us, one way and another, the handsome sum of $17,550? Practically, we know not. Evaporation, washing away, producing crops, and what yet remains, would likely square the account, but how much to the credit or debit of each will never be known.

Thus, in starting the enquiry into our farm practice since 1876, we are met with the two great problems, the unknown physical condition and action of soils, and the known character, but unknown positive effects of climate.

The Science of our Agricultural practice—where is it? Are we doing more than the good average farmer after all? Understand, we are speaking of more than ordinary practical experience, and more than pure practice in crop-growing, in which, of itself, we think, our lessons are good; but wherein are we capable of tracing all the scientific relations of such practice as already indicated?

I have taken many young men over our fields every year, in practical illustration of the lecture room statements, but how much could I say positively in regard to the existing co-partnerships of our allied sciences with the agency under foot—called soil? Have manures been assistants, or substitutes; or among themselves, have they been or are they now competitors as food for crops; how much injurious matter has been dissipated by the action of drainage, certain fertilizers, and cultivation, and to what extent did chemical condition indicate productive powers—active and dormant? These, and others, have been to me, as they are still to many men, dark things, waiting, it may be, a more able and subtle exponent than The Ontario Experimental Farm.

I think the best way to illustrate my subject is to take up some of the crops of 1882, and through them, upon the respective fields, expound as may be required; first then in regard to

FORTY-THREE BUSHELS OF FALL WHEAT PER ACRE.

This means fully twice the average of our Province during the last ten years. The soil is a good clay loam, neither light nor heavy, with a distinct northern and southern exposure—indeed a high-lying, irregular field, without any shelter whatever, except on the south-east. The new reader has to be told that the average field of our farm is situated no less than 850 feet above Lake Ontario, and, therefore, 1,100 feet above sea level.

The adaptability of clay loam to grow wheat is unquestioned; its real or assumed amount of alumina, its consequent firmness, with sufficient mellowing property, the power of retaining moisture, and the whole stamina of it is indicated by the full head and plump, bright sample of grain of a suitable kind, such as the Soule, the Diehl, and, in this example, the Clawson or Seneca variety.

Now, it is perfectly evident that these forty-three bushels per acre were affected by the following :—

1. Weather—winter and summer.
2. Soil.
3. Previous manuring.
4. Cultivation, as applied to tillage.
5. Rotation of previous cropping.

These stand in the order of their influence—from greatest to least—according to our experience, and partly, no doubt, to individual judgment. In criticizing this placing of Ontario cropping regulators, it must be remembered that in addition to our extensive experience, our appliances, methods of observation, and much of our line of work, has been special in that direction. If anybody says, for example, that in their experience an appropriate, and judiciously applied—*i.e.* not an unbending—system of rotation of crops, has been of greater influence than cultivation, in the average production, we would have to ascertain just exactly the whole going and coming of their cultivation; because many farmers are miserable workers or tillers of the soil, and yet obtain wonderful crops—they place more on rotation than on cultivation—all the while that good produce was got through good soil with farm-yard manure. We cannot undervalue rotation, especially in the older townships, but, in all our knowing, it is second to proper cultivation.

Were doubt admissable as to order of precedence in this cropping influence, it might be spoken of as between manuring and cultivation. There, no doubt, the particular soil would turn a finely balanced valuation on the one hand, and an appropriate manure to that soil and the particular crop on the other. So, altogether, while adheirng to the foregoing list, a liberal allowance must be made for specialities.

If possible, to help us still further in tracing the source of these forty-three bushels of wheat, it is necessary to submit the previous cropping, cultivation, and manures applied.

CROPPING THAT PRECEDED FORTY-THREE BUSHELS PER ACRE OF FALL WHEAT.

1876.	1877.	1878.	1879.	1880.	1881.	1882.
Hay, 1⅛ Ton.	Pasture Poor.	Pasture Poor.	Peas, 27 Bushels.	Oats and Barley, 20 Bushels.	Bare Summer Fallow. Manured.	Fall Wheat. 43 Bushels.

The crop production of this field (No. 5) from 1876 to 1880 inclusive, exhibits a very clear case of under average; the hay of 1876 was only one and one-sixth ton per

acre, and the pasture of 1877 and 1878 was of a poor description—few plants, no tillering, and no vigour of any kind. On the breaking up of the sod, and a crop of peas taken in 1879, something good was anticipated because the season was propitious, seed good, and free of disease, but still there was no crop to speak about, only twenty-seven bushels per acre from two varieties. Oats and barley, in equal divisions, followed in 1880, not wheat, as would have resulted by the rotation used as a guide, because it was evident something was wrong. This also was practically a failure—not even half a crop. An examination of the field at this stage showed nothing to the eye as needed by drainage or manuring; we had been building upon a pretty thorough management of the root course in 1874—and the taking of but two crops of hay—1875 and 1876—though by-the-bye the field lies a long distance from the manure pile—a suspicious cause of poverty on many farms.

Had we followed our rotation guide, the crop of 1881 should have been roots, and would have been so but for the fact of many weeds, principally thistles, and that much of our previous experience had failed to thoroughly eradicate them by root management. Thus, bare summer fallowing was decided upon in 1881. It has been proved again and again, that bare fallowing is not always, as imagined by many, a means of enriching soils, as well as cleaning them; we have the most clear evidence, from extended and reliable experiments, that under the majority of conditions, such a form of repeated exposures of the soil to the atmosphere tends to depletion in place of enriching. But, as already said, it is not always the case. Where land has been indifferently cultivated, where possibly richness had been accumulating both from natural and artificial means, and where consequently *inactivity* had been induced by such conservation of energy, the five years' practical deadness can be accounted for.

In proof of this position, we think it is plain that the fallowing of field 5 in 1881, in addition to the farm-yard manure applied, that is repeated ploughings from May to September, so exposed, deepened and made dormant materials active, as that it was fitted to produce any crop in greater abundance than previously it could possibly have done by any other mode of treatment. Unquestionably the farm-yard manure did not act so much as an immediate stimulant as is generally supposed—one-half at least of the value of this form of manure lies in its physical action upon the soil, thus assisting the fallowing process and adding to future fertility.

The winter of 1881-82 was not particularly good, not even good for average wheat life, and summer weather, while propitious, was nothing remarkable for growth and maturing.

Sixty Bushels of Oats per Acre.

This is one-half more than our usual produce. The preceding case of forty-three bushels of wheat illustrated the want of thorough tillage on an old field—this is evidence of the value of comparatively new land from a completely waste swamp (field 15), drained and stumped between 1877 and 1879, and finally cleared up in 1881.

The cropping has been:

1877.	1878.	1879.	1880.	1881.	1882.
Swamp.	Corn and Rape. Thirty Tons.	Oats. 25 Bushels.	Oats. 28 Bushels.	Mangolds. 1,006 Bushels.	Oats, (Seeded) 60 Bushels.

Soil a deep, open, friable clay loam, with patches of a thin vegetable surface, and three acres of a dishy and more mucky swamp, having a subsoil of clay loam upon a bed of shell marl. After drainage and part stumping, the first crop was corn and rape, broadcast, for fodder, with the view to break up and bring under an evident superabund-

ance of good things. Result—an immense bulk of *stalk* without corresponding leaf. Good thus far ; and in 1879, in order to further subjugation, oats were sown ; yet, again, such a rank growth of straw, without grain in proportion, only twenty-eight bushels per acre, that we determined to test the maxim laid down by one of the early agricultural fathers, that land that has given a good crop will give another good one of the same kind in succession, so, in 1880, oats were repeated. The weather was fairly favourable, as in 1879. We were disappointed but not surprised—experimental work must needs *bear* a great deal. By this time drainage was telling, gross vegetable matter undergoing changes, and general clearing of tree rubbish being overtaken, but still no crop to mark progress. Summer fallowing was not needed to eradicate weeds, and mellowness prevailed all over. Maybe some of our friends will interpolate, why did you not send the students to the field with phial and acid to test for noxious matter, or for anything that might be wanting?—theoretically good—sometimes practically advantageous, we reply, and in this it was not neglected by myself, but practical experience is better than most scientific help.

The land was simply too strong in fertility, and wanted lime and salt to check and correct. I am of opinion, that had we applied per acre 100 bushels of lime and four hundred pounds salt, along with a thorough use of the plough and harrow for another crop of oats, the result would have been superior to what was undertaken. But, being desirous of adhering as closely as possible to our rotation guide, a fallowing with roots, mangolds chiefly, came in 1881. These, as usual, received farm-yard manure and special fertilizers. It is a question at this point, whether fuel was not added to the flames by such treatment, more fertility to what we think had already an overabundance of it? Of course, the salt by itself, and lime from mineral superphosphate, gypsum and bone dust, were intended to act, and these no doubt did act, more as *medicinal agents* than direct food supply ; but farm-yard manure must have stood partly as a direct feeder, as well as an opener up and tiller of the soil.

A clear knowledge, could it have been got here, of the exact line of association of science with practice, would have revealed a most interesting and highly valuable field of agricultural study.

Natural wealth, added fertility, medicinal fertility, and thorough cultivation gave us, in opposition to a highly adverse season, one thousand and six bushels of mangolds per acre.

Then followed, the subject proper of these notes, sixty bushels oats per acre. The Black Tartarian variety, one year in Ontario from Scotland ; strong straw of good quality, but much rusted by a moist, hot season. Still, too much stalk and not enough grain, for although sixty bushels is a big crop, had head corresponded with straw we would have had eighty bushels per acre.

Two Hundred and Five Bushels Potatoes per Acre.

We have not been very eminent as potato growers, because, I think we have paid more attention to roots proper, and partly because previous management looked upon potatoes as requiring, and perhaps deserving, less attention.

Field 2 is broken by a ridge of gravel, having on both sides a flat of warm, free loam, that has regularly come through the prescribed rotation. As we always treat potatoes as part of the root division, they got here the usual amount and variety of manures immediately before drilling, or rather ploughing, and planting every third furrow. The Early and Late Rose varieties have all along led in size, quality, prolificness, and reliability under disease. We have never been able to place the potato as a fallowing crop so well as turnips and mangolds, because the character of growth is such as prevents the free use of the hand-hoe ; so also as a feeder from below to the overlying tubers it takes a distinct position, in mellowing and enriching the surface.

Over two hundred bushels per acre—six tons—is a fine crop, which in science and practice anywhere, implies much that we are ignorant of in soil or atmospheric sources of starch, sugar, potash and sulphuric acid. In practice we see and can estimate the different action of potatoes to turnips, but what can we tell of the different condition of the soil after the removal of the respective crops.

Twenty-five Tons Corn Fodder per Acre.

The average crop of this fodder, green, in field, was twenty-five tons per acre, the highest thirty-five. I am not well up in the growth and management of this cereal for grain, simple as it is to many, but have handled it extensively as a fodder plant. Its position for grain in a rotation—when cultivation plays a prominent part in its management—has never been well defined, that is, having a place on sound scientific and practical grounds in accordance with previous and succeeding crops. Cereals, as a rule, are not cultivated, and thus corn is sometimes used for fallowing, at other times for breaking up sod in preparation for other crops. Indeed, it can well take the place of both, thus :

Corn or Roots,
Wheat,
Hay,
Hay.
Pasture,
Pasture.

But, there are just two important questions to Ontario farmers in the cultivation of this fodder, its effect upon land, and its preservation for winter use. Much of the cause of no increase in production has been the fifty per cent. of waste by having to shock and leave in the field during winter, until consumed, and the not knowing how to preserve under cover. I believe a complete revolution is afoot in this regard There is nothing more common-sense and natural than that our corn fodder should be daily accessible in the immediate neighbourhood of our cattle as much as other fodders and green things during winter. The wonder is that some plan was not earlier thought of, and, after waiting so long, that it is so simple and efficient as in an ordinary cellar—ensilaging in a silo as it is called. I have every hopes of seeing this system in extensive use in our present cellars within a few years—not of *necessity* in new built silos. We have now thirty tons in an old cellar specially arranged to test as an inexpensive method for the average farmer, believing this to be more our line of work than building a special pit or silo at $500 or $1,000.

Granting the success of ensilaging, to what extent will the country be justified in growing a larger area of the corn fodder in connection with mixed farming, and where best would it come in the rotation, for of right, if not of necessity, it would demand an annual position in sound agreement with science and practice? Why not in association with peas, thus ?

Peas and Corn,
Wheat,
Roots,
Wheat (seeded),
Hay,
Hay,
Pasture,
Pasture.

Suitable for the corn plant after grass and clover, helping the pea to break sod for wheat, and not too "hard" after four years hay and pasture.

Eleven Hundred Bushels Mangolds per Acre.

With long reds and yellow globes, over six acres, we had one thousand one hundred bushels, or thirty-three tons per acre, in field 2. Just twenty-nine tons water per acre,

some may say. It is just possible that corn fodder may supersede turnips and mangolds to some extent, and as they are about equal weights per acre, on an average, it is a question of feeding value per acre.

From Twenty Tons per Acre we have

	Corn Fodder.	Half Mangolds, and Turnips.
Albuminoids	1,000 lbs.	640 lbs.
Crude Fibre	2,680 "	380 "
Carbohydrates	4,680 "	2,880 "
Fat	280 "	40 "
	8,640 lbs.	3,940 lbs.

This cannot but astonish some root growers, and may convert not a few, though we trust the conversion will be properly disciplined. Volume of materials, as in the above example, does not necessarily imply more beef or milk, because the *form* in which food is presented, even in the natural state, is a heavy element in nutrition. It is quite obvious, however, as previously remarked, that when able to economically and successfully preserve corn fodder, the turnip and mangold area is sure to diminish in Ontario proportionately to advancement and to number of live stock.

Seven Hundred Bushels Sugar Beets per Acre.

We have grown these experimentally every year since 1876, and this year to a considerable extent for experimental feeding of Cattle, against carrots, turnips and mangolds. The varieties are :—

1. White Grey Top.
2. White Green Top (Brabant.)
3. Electoral.
4. White Green Top.
5. Early Rose.
6. White Red Top.
7. White improved (Vilmoring's)
8. White Sugar.
9. Imperial.
10. White Small Rooted.

Our turnip and mangold growers do not like the fingery character of some of the sugar beet, making harvesting and cleaning so difficult, though pleased with their better keeping properties. They contain less water and very much more carbohydrates (starch, sugar, &c.) than turnips and mangolds, and may be called an expensive green fodder when it is a fact, it is said, that even their pulp, after going through the sugar mill, is a high feeding material.

Eight Hundred Bushels Carots per Acre.

This is still a greater proportion of starch and sugar, more Albuminoids and more fat than any of the other roots proper ; why then are so few of them cultivated ?

The White Belgian, with us, is unequalled in vigour and weight per acre. Our acre this year was in No. 2 field, a low lying, dry, deep loam, well cultivated and manured. Plants were left rather close—four inches—as we did not anticipate more than ordinary produce. Very many of the roots, however, measured over twelve inches in circumference at top, and so a common sight was a fight for side space, some being actually pressed out of line.

Eight hundred bushels (twenty-four tons) per acre of roots that go an average depth of nine inches, stand for a kind of cultivation that is neither common nor liked by many,

and both thinning and harvesting are comparatively expensive, but, the present ordinary market would give us $120 per acre, as against $65 and $80 for turnips and mangolds, respectively.

Hay and Pasture from varieties of Grasses and Clovers.

There is nothing in all agricultural practice anywhere that gives such an idea of wealth under comfortable conditions, as a rich meadow occupied by cattle or sheep. Rest, and growth of flesh, milk and wool, with a conserving for future crops, that pasture alone can best provide. Any amount of practice, lecturing and teaching, will never make any people first-class, independent farmers, until they know well how to secure and maintain permanent pasture.

But the average rotation pasture is not what animals demand. Canada, as yet, practically, makes hay and the pasture follows as best it may ; hay is not made subservient to pasture : reflect one moment on this inconsistency. In order to obtain one and one-half ton of fodder per acre, per season, twice, for winter use, valued at $30 ; we grow one grass and one clover together, a great part of the latter disappearing the second year, and altogether the third year ; the single grass is therefore the only pasture for the third and fourth years, when it is again broken up by rotation. On the other hand, when the proper kinds of grasses and clovers, in variety, are sown, as detailed in last year's report, there is an annual offering, reliability, and value almost incomparable. But compare them thus :—

Value of Hay and poor Pasture *versus* Value of Hay and Good Pasture.

PER ACRE.	Hay and Poor Pasture.	Hay and Good Pasture.
	$ cts.	$ cts.
First Year, 1½ tons hay	15 00	15 00
Pasture, one year	1 50	2 50
Second Year, 2 tons hay	20 00	20 00
Pasture, two months	2 50	3 50
Third Year, Pasture	6 00	12 50
Fourth Year, Pasture	5 00	12 50
Total	$ 50 00	$ 66 00

Not allowing for superior manurial condition of the proper mixture of grasses and clovers. In the one case, we obtain $35 of hay, and only $15 of pasture ; in the other, about equal values of both hay and pasture, and this is what it ought to be, equal values per acre per annum, no matter what the crop is.

Such, in variety, and importance, all over our farm of twenty-one fields, of twenty acres each, is now the position of science and practice. There is not a poor subject, except No. 21 ; all are flushed with an abundance of good things.

CROPPING ABSTRACT, 1882.

Field.	Area.	Extent of Cut Crop.	NATURE OF CROP.	Quantity. T. Tons. B. Bushels.	Total Quantities.
		10	Pasture		
1	20½	10	Corn Fodder	25 T.	250 T.
		2½	Tares and Oats	2 T.	5 T.
		7	Mangolds	1,000 B.	7,000 B.
		2	Turnips	600	1,200 B.
2	19	2	Sugar Beet	500	1,000 B.
		7	Potatoes	205 B.	1,435
		1	Carrots	800 B.	800 B.
3	22	22	Pasture		
4	9	9	Fall Wheat	43	387
5	13½	13½	Fall Wheat	43	580
6	25	13	Hay	1¼ T.	18 T.
		12	Barley	30 B.	360 B.
7	20¼	20¼	Hay	1½ T.	30 T.
8	22¼	22¼	Spring Wheat	23 B.	511 B.
9	21¼	21½	Hay	1½ T.	30 T.
10	19	10	Oats	40 B.	400 B.
		3	Experimental Wheat		
11	21¼	21¼	Peas	35 B.	735
12	18½		Uncultivated		
13	23	23	Pasture		
14	23		Summer Fallow		
15	21½	21½	Oats	60 B.	1,200 B.
16	22¼		Summer Fallow		
17	20	10	Hungarian Grass	1¼ T.	12 T.
		10	Millet	1¼ T.	12 T.
18	19	13	Fall Wheat	30 B.	390 B.
19	30	16	Oats	40 B.	640 B.
		14	Turnips	800 B.	11,200 B.
20	11		Uncultivated		
21	16½	16½	Pasture		
	417¾	331	Under Crop 1882		
	132¼	45¼	Under Summer Fallow		
		29	Uncultivated		
		144¾	Other Lands		
	550	550			

III.—THE LIVE STOCK.

THE GENERAL CONDUCT OF OUR CATTLE.

As an accompaniment to what has been said about the farm cropping, I propose to sketch our seven years' experience with six breeds of cattle, and five of sheep. This should mean a great deal ; management, food, and condition of climate having affected all alike, our comparative notes for such a lengthened period cannot fail to interest.

The Canadian.—I know of no class of cattle so well deserving a first notice in these pages as the Canadian. There is a distinct type entitled to this name. I do not mean those with a touch of Ayrshire, Devon, or any others—not even the shorthorn grade, but that moderate sized, milking, wiry, active stamp, well known to the average farmer. If this be considered as somewhat indefinite we shall be glad to point to specimens here or elsewhere. I claim that the Canadian deserves more notice than has ever been given to it—public and specific—giving a recognized position that cannot be doubted. Have we on record anywhere, such a description and history of the Canadian cow as that ; when the time comes, as come it will, when the Herd Book Editor will require materials with which to trace back to the beginnings of what, with him, may be as eminent as any Bates or Booth in England ? This is no improbable matter indeed, but deserves our serious attention.

Our experience of this breed has been intimate and very satisfactory. We hold, by

clear and substantial evidence, that the Canadian cow takes no mean place as a milker, a mother, and a field for wide work, both for beef and dairy purposes. Much is due to her distinct character in some respects : she is decidedly content with her average circumstances—miserable as they be at times ; can do as well in the bush as on clover fields, and responds with her best when the thermometer is at zero, or 90 ° in the shade. Her quantity of milk is not so large as the Ayrshire for six weeks after calving, but far ahead in continuance, and therefore, on an average, equal ; in cream it is unquestionably superior to the Ayrshire. No one well acquainted with the breeds would choose the Ayrshire against the Canadian, where hardiness and profits under ordinary conditions were elements.

So also in regard to a common source for cheap production of beef with a Shorthorn or Hereford bull—other bulls have not, as yet, been sufficiently tried, except the Ayrshire and Devon, which cannot compare with these two. While small as a beefer, the Canadian cow is roomy as a breeder, and thus affords field enough for such a purpose..

I am confident that a proper selection of the milking Canadian would add immensly to the dairy and beefing interests of the country.

The Devon.—The remarkable feature of the Devon with us has been an uniform conduct, no coming and going in anything, but an even run of breeding, health and good doing, under all conditions. Summer and Winter the Devon is equally at home ; plump on pasture, and in good heart in the stall without grain. They have been also particularly good mothers, nursing their calves in a manner superior to anything in our experience. The Devon calf is always a full calf on its own milk alone, rolling in fat and with all the build of an old animal. The particular character of the breed, and rich milk give these results. After weaning, and all up to heiferhood breeding, there is a distinct heartiness and vigour—on the small scale as regards size ; there is no stunting according to their kind, but one has to know the kind in order to appreciate the difference between them and the larger beefers. We have never got much milk from a Devon, but in quality it is second only to the Jersey. The bull attains to a greater size and weight, proportionately to the cow, than the same thing in most other breeds, as his "get-up" is comparatively more of a beefer than, for example, the Ayrshire bull is against the Ayrshire cow. The Devon cow, therefore, is a milker in quality and moderate quantity, while the bull gives a frame to the steer that compares well with others for beef carrying. But the steer will not mature so early as the Shorthorn, Aberdeen poll, and Hereford, nor ever attain the same weight on an average.

The Ayrshire.—We have had a pretty thorough test of the Ayrshire cattle. In sure breeding we have no cause to complain, nor can anything be said against their adaptabiliy in raising a calf. Every cow we have has had to be milked three and four weeks previous to calving—an imperative necessity to avoid milk-fever. After calving, two of our best have regularly suckled two calves, and, in addition, have had to be milked with the hand twice daily for two and three weeks—depending upon the time of the year—whether on grass or in stall. We have not, however, been treated to that continuance of milk that I was intimate with in the Lothians of Scotland—the great flow lessening more rapidly and dribbling too long. I do not attribute this to actual poorer pasture or keep otherwise, but to the great difference in climatic conditions and to the want of that important variety of grasses secured only in permanent pasture. It is not true, in our experience, that the Ayrshire cow gives a lash of milk on comparatively bare pasture—in which regard she is, on an average, decidedly inferior to the Canadian—but it is true that her milk is of that blue type, not so rich in cream as characterizes them in their own country. A cross between the Ayrshire bull and Canadian cow is in good repute as a milker with us ; they do not lose in size of frame, and gain somewhat in long milking. A cross with an Ayrshire cow and Shorthorn bull has not shown any advantage in milking, and very little in build for beefing, though the steer is vigorous and growthy, but too slab-sided and wedgy—taking too much after the mother. Practically, then, as regards the pure Ayrshire, they require good treatment in order to maintain their famous milking properties, and I am of opinion that an infusion of new blood is as often needed as in any other breed—not so much a change of bull from other herds in this country as that of a directly imported one.

The Hereford—This breed has exhibited a very clear and steady line of conduct all throughout. No trouble in breeding, and no petting required. The Hereford is a good mother—second only to the Devon, in our experience, and ahead of its dangerous compeers, the Shorthorn and Aberdeen poll.

We have been charged with partiality and lack of practical experience in cattle life by our American critics, especially in comparing Herefords and Shorthorns. This is not true, and I trust will never be so. As responsible to a liberal Government, and guiding a grand country it is, above all things, our religious duty to report just how it is in every case—no colouring, no exaggeration, and no understatement of anything whatsoever. To say more is unnecessary, to say less would savour of want of interest.

The Hereford, I repeat, has shown an uniformity of conduct, quite exceptional along with the Devon, without grain winter and summer—bran excepted, and the usual treat after calving. The Hereford keeps fat on pasture and in the stable, never falling off, even when suckling. Greedy enough, no doubt — down to the horse manure—not a specialty as showing a want of something, but a consistent looking out for number one. We have no breed, as a whole nor individuals among breeds, that can touch the Hereford in maintaining flesh on pasture. Indeed, we have cases of too much tendency to covering the ribs, and taking from the calf; and a peculiarity of their build is the being deep in calf and not showing it, as is otherwise in most other breeds—the calf also coming without affecting the mother's appearance much.

The fattening steer from the Hereford bull and Canadian cow is quite characteristic; the marking is strong and unquestionable; the build is a Hereford in almost every detail —the pig ham (as age advances), the round compact barrel, longish rumps, deep twist, and the general low chunky set of the whole animal.

The Shorthorn.—We have never treated one breed of cattle or sheep differently, unless special circumstances demanded; thus, then, these comparative notes are the more valuable and reliable. I say this here because Shorthorn history with us has been more complicated than with other cattle—not, certainly, by reason of want of variety in blood and family, nor even numbers to make a good average, for we have, or have had, plenty of both. With Shorthorn leanings, as an individual, I can freely and fearlessly, nevertheless, record how Shorthorns have conducted themselves with us for seven years.

We can speak highly of the milking properties—in quality and quantity—of the most of our cows of this breed, making good calves or reliable milkers, as the case may have been. We have nothing to say against the sure breeding of the cows, but our four bulls, in these years, have not given satisfaction in this respect. Without exception, they have caused delay, loss, trouble, and extra expense. Why, I am not prepared to say. Two were imported, and two Canadian bred; none were ever in such high flesh as those of some other herds, indeed, we have noted very distinctly that those bulls in best flesh—that is on the heavy side—have been surer in getting than those on the less fleshy side. But—and I desire most seriously to make this "*but*" once and for all understood—we have never fed Shorthorns differently from others; if we had done so, this would be no *experimental* station. Understand what I mean by this. If we have a two-year-old Shorthorn bull with a large frame weighing 1,600 pounds, and a Hereford exactly of the same age and of a smaller frame weighing 1,500 pounds; we feed them according to weight or size, a little more to that weighing the most; this is in agreement with all rules of common sense as well as science and physiology—not breed; because we do the same thing with individuals of the like breeds, *but* we have never fed the Shorthorn because he was a Shorthorn, nor the Hereford or Aberdeen bull because of their kind. This is the true experimental idea, we think. If, it is said, the choice of individual bulls was bad, then the reply is that three independent judges did so; if management by want of practical knowledge is charged, then the same management had ado with the other bulls that have stood so well. If the Shorthorn require on an average more drawing-room attention than other beefing breeds, then it had better be acknowledged at once, and I do not think their admirers need be ashamed of the fact.

We have fattened Shorthorn grades, Hereford grades, Devon grades, Ayrshire grades, and Galloway grades, both in the stall and on pasture, and nothing equals the Shorthorn

in giving that stamp to produce weight in the shortest time on *Ontario conditions*—growth of youth on good pasture, and finishing in the stall.

The Aberdeen Poll.—We hold the honour of having introduced this breed to Canada, as put by Mr. McDonald, the clever author of "Food from the Far West," as well as the recent work on Aberdeen polls, who is also editor of the "Irish Farmers' Gazette."

Our experience thus far is somewhat irregular. Health and breeding have been very good, milking sure in moderate quantity and rich, with plenty of flesh both in stall and pasture, yet we have to record an indefinite sort of instability difficult to explain—I speak now of the first imported animals and their progeny, not of 1881 purchases. The instability in question has reference to a coming and going of health, especially in summer, as indicated by change of coat and a general "staring" of the whole animal, as if going through a course of medicine. Individual animals of any class often do so, as everybody knows, but not a whole herd of one kind. There has been no sickness, actually.

We have on hand some very fine steers—the first cross of an Aberdeen poll bull with Shorthorn grade cows, with which we trust to convince the Province ere long as to the eminent beefing properties of the Black Diamonds of the North of Scotland.

2.—General Conduct of Sheep.

As it is not the breeder of pure breeds of sheep who rule the flesh market, any more than in the case of cattle, the common sheep of the country are entitled to a distinct place in our agricultural history.

The Canadian Ewe.—What is she? A very difficult question to answer. If road-side samples be taken as a guide she is everything and nothing, most clearly. The reference to the road-side bids me say that of all kinds of pasture in Ontario—I cannot speak of other Provinces—whether rotation, permanent, bush, or cleared wild pasture, upon farms, none equals much of what covers one-half of the width of our highways; it is a close mat of the better native grasses with white clover, offering at all times a rich sweet bite for sheep, and is top-dressed every heavy rain by the washings from the traffic-manured centre. As each township on an average possesses about 250 miles of opened roads, of which one-half of the area is under such pasture, there are actually one thousand acres of an excellent sheep run able to maintain at least one thousand head annually. This is no fancy, and I do not care though some sceptic belie it—say 500 head, therefore. There being 300 townships in older Ontario, we have the magnificent figure of 150,000 sheep that could, at the lowest estimate, be maintained at no risk or annoyance to anybody on our highway pasture. By the August statistics of our Bureau of Industries there are 2,000,000 sheep of all ages and kinds in Ontario—say 1,500,000 for the older parts referred to, which shows that over one-tenth of their number either are or should be kept upon the road—allowance being made for thoroughbreds that are not allowed such liberty. The annual value of this "commonty" cannot be put at less than $300,000.

The Canadian ewe, on an average of localities as influenced by great centres of long and short-wool pure breds, is a mixture of Leicester, Cotswold, Lincoln, and Southdown in all degrees of variety, but generally with a predominating Leicester type. She is roomy according to size, fairly well woolled, weak forequarters, ewe necked, and combines hardiness with ability to raise a good lamb and give above an average quality of mutton.

The Leicester.—After the Canadian, which traces so much to Leicester, the same Leicester deserves our next notice. Our experience has been nearly altogether with the border type, and not the English proper, which, it is now well agreed, differ only as affected by conditions of upbringing—not in blood or original source. We have nothing in sheep life that can touch the Leicester in being early ready for any purpose, on getting what it likes. Breeding has not been so sure or prolific, about one lamb per head; they are but moderately good nurses, being too selfish in the disposal of their food. The Leicester is essentially a Bear in character, laying on fat for hard times, and hence the abundant supply of milk is not prominent on an average. Lambs come with a delicate bearing, but once over the first month their progress is wonderful. Friend Bakewell's soda-water bottle is still a feature in their build, and so also is the want of wool below on young as well as

old animals. Thus we have evidence of the prepotency of the Leicester. The fattened wether with us is simply an extraordinary piece of mutton—I mean the shearling wether, as nothing older is admissible in these days of sharp profits—the immense depth, breadth, and prominence of the fore-quarters, the filling in of the arms and thighs, and the general bunching of outside fat is a fine piece of study—peculiar and curious. Who would eat it? Not many by choice, certainly, and very few by compulsion, when the shearling weighs 307 pounds, as we had this year.

The Southdown.—England's choice mutton—the great little breed of its chalk hills. We purposely place this after the Leicester as in our opinion it is a Leicester in build and maturing. It is difficult to do justice to this breed with pen and ink, because it is easier to describe a faulty animal than a perfect one.

I desire to record without any touch of doubt that the Southdown is unmistakably our best friend at Guelph. I say Guelph, because, as in any sheep life, conditions of climate, altitude, soil, vegetation, and management affect so strikingly, even on neighbouring farms. Friend here means one and one-half lamb per ewe—coming early, strong, plump, and with all the build of a mature animal. The average weight of a *newly-born* lamb is as heavy as the average of any other breed. The Southdown is a splendid mother—doing as well to two as the Cotswold does to one lamb; no doubt she does not do so on nothing, as in comparison with size, she is a great forager. So prominent is this breed in milking properties that any difficulty we have had in udder affections has been with it. The Southdown do not go and come in flesh so much as any of the other breeds in our hands, and they are much less subject to disease, and when under any trouble they recover sooner and are more reliable afterwards. These are very marked facts in our experience—away above all doubt.

In regard to fattening and the power of improving other breeds, or rather the production of value of wool and mutton with the common grade ewes of the country, it is on record elsewhere in this report that while less in weight there is a value of these products that places the Southdown second to nothing, and equalled only by the Shropshire.

The Cotswold.—We have had a larger flock of Cotswolds than others and as true animals of their kind, as in any others. The grey-faces and the larger stamp of the white-faces have been handled here. One and one-fourth lamb per ewe is the average produce. They do not come so strong and so well made up as the Southdowns, but once fairly into milk and extra food make rapid progress. The ewes are moderate mothers, and great eaters. We have no breed so liable to catarrh, or "snifters," as this, and we hear the same complaint from other breeders. Sudden change of weather, a wet bed, or any unusual climatic condition is sure to bring nose runnings. Even the newly-born lamb is sometimes affected. The Cotswold maintains wool in quantity and quality well, and longer than the Leicester. In fattening we cannot finish them so early as the Leicester, Southdowns and other Downs, and they are slower at taking on the "last dip,"—but for great weights nothing can beat them.

The Merino.—The extremes in sheep life with us are the Cotswold and Merino—the size and coarse wool of the one against the size and fine wool of the other; they are alike in slower maturing—the Merino is too unsettled, and too much of the race-horse stamp to fill our views of a modern mutton producer. But, practically, our experience in pure breeding has been very limited—has been more in the line of testing the value of the offspring of a very fine French ram with the common ewes of the country. The marking in frame and wool is most striking—never doubtful, even to the temper. Wool from hoof to horn—wool everywhere, except a small part of the face and muzzle on the grade. The clip, in weight and quality, stands high, and the fattened shearling wether has surprised us in weight and good handling, as to which see special notes in this report on killing of various grades.

The Shropshire.—We like this breed for several good reasons proved by our own experience. It is reliable in breeding and prepotency, the ewes hold flesh easily and without danger, are average mothers—not equal to the Southdown—prolific, averaging one and one-half lamb; give a heavy close crop of medium long wool of fine texture and average lustre. In weight of carcase and wool it stands between the Southdown and Oxford Down. In competition with the five other breeds the Shropshire is equalled only by the

Southdown in value of annual productions, and where extreme quality of flesh and wool is not the sole object of the flockmaster, but more weight of both crops and somewhat less quality, then the Shropshire will lead in much of our future in Ontario.

The fattened grade wether is a nicely balanced piece of mutton, a little on the late side of maturing, not broad enough in the forequarters to some minds, and just a little leggy, but grand quality in bone as well as handling.

The Oxford Down—The most modern of imported sheep, and showing much of the size and nobility of one of their progenitors—the Cotswold. If it be true that the issue of a Cotswold ram with a Hampshire ewe, put to a Southdown ram, was the origination of this breed, then Cotswold power must be strong, because, as I have said, size holds, and the more open and coarse staple of wool also tells of Gloucestershire influence.

We had the honour, practically, of introducing this breed into Canada in 1876, when advised to purchase Lincoln, we preferred to give the Oxford Down a place. Anticipations have been very satisfactorily realized. For early maturing, maintenance of weight, power to produce through the common Canadian, making good mothers, and giving *one and two-thirds* lambs per ewe, no other breed equals the Oxford Down, on an average. Value in these times, of course, is not necessarily implied in such a strong statement as this, but, to those who desire a medium wool—on the long side, somewhat open and coarse, comparatively to other Downs—a heavy fleece, a strong, square frame, early flesh of good quality, with ability to reproduce these through a common source, the Oxford Down must command a high place.

3.—Our Sales of Live Stock.

Since our original investment of $8,000 for imported live stock in 1876, and $2,000 of subsequent purchases up to 1881, we have sold surplus animals to the value of $15,600 and retained part of its produce, valued at $3,000. Thus, then, $10,000 have given us $18,600 in an average of five years. This is no remarkable result in respect to rapid returns, but in other ways it may be called an unusual thing for a public institution. The surplus stock consisted of fifty head of cattle, and five hundred sheep, of five breeds each, all pastured. Excepting British Columbia, every Province of the Dominion can speak of possessing blood from us, and we have had but two cases of disappointment. At every public sale, and particularly that of 1882, the disappointment expressed, very plainly, has been in regard to our want of materials in numbers to meet the demand. "Why don't you import more—$50,000 in place of $7,000, so that the small farmers may have a chance of something good, and always unreserved, as you have done, and not have so many bidding against each other, until prices are too much for us?" We have only heard of one instance of jealousy on the part of a breeder, who imagines that our handful affects the market to his disadvantage—a few cattle and sheep merely on this great continent! In place of this narrow view of our position as breeders, it stands as a clear fact in the knowledge of every unprejudiced critic, that our work here in experimenting with cattle and sheep is systematic and healthy production of young animals, and in laying before the country the leading features of the live stock interest year after year, and so to increase the demand as to materially improve the markets of the Province—creating at least a keener interest in certain lines of cattle and sheep.

You have allowed me to call attention to the repeated high offer that we have received privately for certain animals, and that I am entitled to show these as actual increased value of stock on hand, which should annually be placed to the credit of the farm. This is business, and but fair to the institution. To give an idea of this phase of our position, take the following memorandum as applicable to the year 1880, 1881, and 1882:—

	Original Cost.	Have been Offered.
Two-year old Hereford heifer	$150	$ 400
Grade Shorthorn cow, five years old	50	135
Aberdeen poll grade cow	40	150
Hereford cow, 8 years old	260	600
Aberdeen poll bull, 2 years old	450	800
Hereford bull, 2 years old	450	800
Aberdeen poll heifer, 2 years old—imported	400	2,000
Aberdeen poll cow, 3 years	200	800
Southdown ram lamb	100	130
Total	$2,100	$5,815

Public Sale of Surplus Live Stock, September 13th, 1882.

Lot.	CLASS.	Purchaser, Etc.	Amount.	Total.
	CATTLE.		$ c.	$ c.
	Shorthorns—			
1	Heifer calf	W. A. Webster, Lansdowne	112 00	
2	" "	J. & R. Hunter, Alma	102 00	
3	Bull calf	Robt. Reilly, Marnoch	120 00	
4	" "	S. J. Hogarth, Exeter	91 00	425 00
	Herefords—			
5	Heifer calf	R. J. Mackie, Oshawa	150 00	
6	" "	" "	138 00	
7	Bull calf	W. Howitt, Guelph	215 00	503 00
	Devons—			
8	Heifer calf	Geo. Rudd, Puslinch	82 00	
9	Bull calf	" "	45 00	127 00
	Ayrshires—			
10	Heifer calf	E. B. Somerville, Belfast	61 00	
11	Bull calf	Bradley & Roth, Lansdowne	56 00	117 00
	Jerseys—			
12	Bull calf	H. Sorby, Guelph	100 00	100 00
	SHEEP.			1272 00
	Cotswolds—			
1	Shearing ram	Allan Ramsay, Eden Mills	38 00	
2	" "	H. Sorby, Guelph	16 00	
3	" "	J. Nightingale, Prince Edward County	29 00	
4	" "	J. Elder, Rodgersville	61 00	
5	" "	Jno. Carter, Puslinch	28 00	
6	Ram lamb	R. F. Seymour, Sleswick	10 00	
7	" "	Andrew Rowand, Walkerton	18 00	
8	" "	J. V. Snell, Edmonton	15 00	
9	" "	Robt. Gowanlock, Maple Hill	9 00	
10	" "	Jno. Matherson, Lucknow	16 00	
11	" "	Jas. Auld, Guelph	16 00	
12	" "	Thos. Card, Guelph	14 00	
13	" "	W. Buchanan, Flesherton	13 00	
14	" "	S. J. Lyons, Norval	25 00	
15	" "	D. Hanmer, Mt. Vernon	31 00	
16	" "	Jno. Darroch, Cotswold	6 00	
17	" "	W. Sykes, Lennoxville	40 00	
18	" "	W. A. Webster, Lansdowne	7 00	

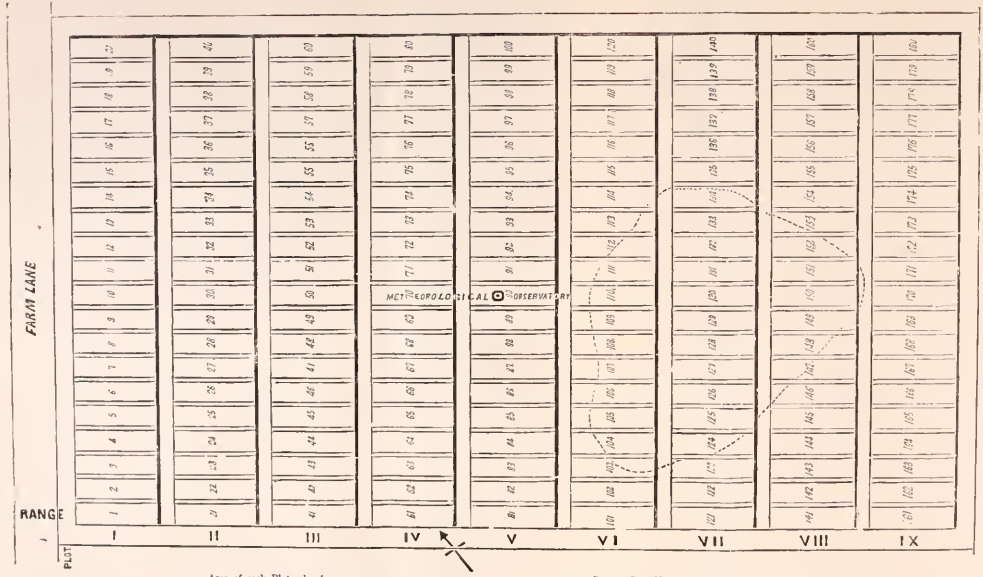
PUBLIC SALE OF SURPLUS LIVE STOCK, SEPTEMBER 13TH, 1882—*Continued.*

LOT.	CLASS.	PURCHASER, ETC.	AMOUNT.	TOTAL.
	SHEEP.		$ c.	$ c.
	COTSWOLDS—	*Brought forward*		1272 00
19	Ram lamb	Robt. Hyslop, Paris	9 00	
20	" "	C. M. Smison, Almonte	7 00	
21	" "	Wm. Spark, Petherton	12 00	
22	" "	Willis W. Beamer, Grimsby	11 00	
23	Ewe lamb	Allan Ramsay, Eden Mills	26 00	
24	" "	W. A. Scholman, Mildmay	18 00	
25	" "	James Edmonstone, Johnstone	25 00	
26	" "	W. Rowand, Walkerton	29 00	
27	" "	Jas. Watson, Eden Mills	29 00	
28	" "	Wm. Ramsay, Eden Mills	20 00	
29	One pair aged Ewes	Robt. Hermiston, Mt. Forest	30 00	
30	" "	Benj. Storey, Picton	16 00	
31	" "	Robert Shortreed, Guelph	17 00	
32	" "	Robt. Fuller, Mitchell	26 00	
33	" "	" "	27 00	
34	" "	W. A. Scholman, Mildmay	28 00	722 00
	LEICESTERS—			
35	Two-shear ram	H. Glazebrook, Simcoe	53 00	
36	Shearing ram	N. Norrish, Nassagewaya	31 00	
37	Ram lamb	David Elliot, Grafton	16 00	
38	" "	Jas. Henry, Marnoch	27 00	
39	" "	Abraham Rowand, Walkerton	22 00	
40	One pair ewe lambs	Robt. Hermiston, Mt. Forest	15 00	
41	" "	John Douglas, Tara	15 00	179 00
	OXFORD DOWNS—			
42	Shearling ram	J. Anderson, Arthur	46 00	
43	Ram lamb	" "	33 00	
44	" "	John Alliston, Fergus	36 00	
45	" "	Richard Rennelson, Galt	25 00	
46	One pair ewe lambs	Wm. Howitt, Guelph	62 00	
46 (A)	" "	" "	100 00	302 00
	SHROPSHIRE DOWNS—			
47	Three-shear ram	Richard Rennelson, Galt	65 00	65 00
	SOUTHDOWNS—			
48	Aged ram	John Douglas, Tara	25 00	
49	Shearing ram	Dr. Coleman, Belleville	36 00	
50	" "	Chas. Kay, Fergus	31 00	
51	Ram lamb	D. McLennan, Glengarry	10 00	
52	" "	Walter West, Guelph	14 00	
53	" "	R. Hermiston, Mt. Forest	10 00	
54	" "	John Irvine, Harriston	11 00	
55	" "	L. Weller, Zephyr	12 00	
56	" "	Geo. Muir, Cumnock	10 00	
57	" "	A. Elliott, Galt	15 00	
58	" "	John Cook, Lansdowne	17 00	
59	" "	Chas. Kay, Fergus	25 00	
60	" "	" "	16 00	
61	One pair ewe lambs	John Cook, Lansdowne	26 00	
62	" "	Wm. Howitt, Guelph	31 00	
63	" "	" "	25 00	
64	" "	Dr. Coleman, Belleville	38 00	352 00
	PIGS.			
	BERKSHIRES—			
1	Boar	R. F. Seymour, Sleswick	25 00	
2	"	Mossom Boyd, Bobcaygeon	24 00	
4	"	S. Sorby, Guelph	21 00	
3	"	R. Hermiston, Mt. Forest	12 00	
5	"	D. McLennan, Glengarry	7 00	
6	Sow	D. Belzner, Salem	6 00	
7	Boar	D. Snyder, Roseville	5 00	
8	Sow	Jos. Edmonstone, Johnston	5 00	
9	"	R. F. Seymour, Sleswick	5 00	110 00
		Gross total		$3002 00

ONTARIO EXPERIMENTAL FARM.

EXPERIMENTAL FIELD PLOTS.

(Field 14 of Farm.)



Area of each Plot $\frac{1}{10}$ of an acre.
Width of Range Roads 20 feet.
Width of Plot Paths $4\frac{1}{2}$ feet.

SOILS { Ranges I. to V.—Clay Loam.
Ranges VI. to IX.—Gravelly Loam.
Within dotted line—Vegetable Mould.

Scale—One inch to 132 feet.

IV.—THE EXPERIMENTAL DEPARTMENT.

We have to record an important change in the Field division of this branch of our work. Hitherto all the many details of modes of cultivation, manuring, testing of crops, and sample growing, have been confined to an area of four acres adjoining the farm buildings and paddock. This field is already broken by a new cottage for the farm foreman, and it is in the plans of the future to remove the present barns to the centre of these four acres—thus, practically our old experimental plots are blotted out; indeed we have already ploughed all over in view to seeding down to permanent pasture in spring so as to secure more room for calves and any other special cases of live stock.

In memory of what has afforded so many lessons to thousands of visitors, some seven hundred students, and myself, take a brief *résumé* of what these four acres have said—whether yes or no, during the last seven years.

In the testing of over one hundred varieties—so called—of winter and spring wheat, while nothing remarkable has been elicited, yet some practical good has been placed to our credit, particularly in showing the adaptability or not of certain European and American kinds to our conditions of climate, in the distribution of a few of the best among our farmers, in admitting a thorough comparison as they stood side by side in the plots, in noting their conduct under various forms of disease, and generally their educational value to the students and others.

With over thirty distinct kinds of oats, a proportionately greater success has been achieved. A very thorough test of their capabilities for Canadian cultivation has been made—on different soils and at different stages of a rotation. In their conduct we have found very distinct differences in liability to rust and smut under precisely similar conditions, and the weight and quality of straw was also very marked. As a whole we are satisfied as to the average reliability of the "side" as against the "branched" varieties, and that the Black Tartarian is most suitable—a greater yield per acre, with medium straw, a fuller head, plumper grain, and thinner skin.

We have proved the good and the bad of some ten varieties of barley, have tried England's best ones with considerable satisfaction, and have bid good-bye to those from Russia. In two-rowed sorts, produce per acre is not equal to the six-rowed, and generally the six is most suitable for Ontario.

There is no kind of pea equal to the Golden Drop and common White for field produce in our conditions, and we have tried five of them. The larger sorts, with stronger straw require stronger soil and possibly a less severe climate than those obtaining in the Guelph district. Nothing else requires mentioning in their cultivation.

The American cereal called *Corn*, is not a success eight hundred and eighty feet above our fresh water seas, as it is unquestionably in other districts not over thirty miles distant. I do not mean that we cannot grow the grain of some of the hardier kinds, as we can, but that under every variety of soil and season over seven years they have not been so valuable as other crops. Their stalk and leaves stand, however, as a subject of paramount importance for green fodder both in summer and winter.

The establishment of more kinds of grass than timothy has been a line of our experimental work of great interest and considerable success. We have most thoroughly tested five kinds, and proved their reliability for all parts of the Province on the assumption reasonable enough, that what succeeds with us on a high-lying and exposed situation will hold good almost everywhere else in the same country. We have regularly grown all the well-known British grasses, never less than twenty varieties, by seeding separately and in association, on different plots, and consequently can speak of their habits under various conditions, of their failures, their early or late maturing, their tillering, their sociable or unsociable habits, their power in re-seeding, their durability in autumn, and their conduct under drought and much moisture.

Clovers as suitable for hay and pasture have been treated similar to grasses and with pretty decided results. We have nothing more to say to Bockhara and the Crimson, but a great deal to recommend about Lucerne and Sain-foin—Lucerne particularly.

The study of green fodder as distinct crops under systematic cultivation for special soiling as well as aids to pasturing, has been well attended to here. We have repeatedly

proved the hardiness, permanency, early maturing, four cuttings per annum, and the high feeding value of the Alfalfa or Lucerne—never doubtful, never ungrateful under proper management. Of the dozen varieties of plants thus handled, we can point to one as still questionable : The Prickley Comfray has disappointed. It is hardy enough, offers a fair cut every month from May to September, but so long as other fodders can be had no class of animals care for it in any form, in our experience.

Root crops have not been neglected, and much information gathered. No fewer than thirty varieties of turnip, mangold, sugar beet and carrot have been cultivated. Practically, the farmer need not trouble himself with more than five, three, and two kinds respectively, when our wants are told by weight per acre, good keeping properties and quality as food. No doubt, soils regulate the selection of kinds as well as class, but good management will produce heavy crops of all on almost any soil in Ontario.

The form of grass called sugar cane, has been successfully matured in our high latitude and altitude, and thus establishes an important fact either for fodder or sugar. Growth during the first month is not nearly so vigorous as corn, but afterwards makes rapid progress and finishes as quickly.

Every year over twelve sorts of potatoes have been experimented with, but no mode of management, manuring, or kind of soil can make any equal to the Early and Late Roses. They stand unequalled in produce, keeping properties and quality, thus then but corroborating the most of other provincial experience.

These and other crops of minor importance go to make up our field crop experimental bill of the past. How many successes, and how many failures, it would be difficult to tell exactly, and few people are aware of all the care, judgment, watching, comparing, and general supervision, that has been exercised, well or indifferently, through so much in these long seven years.

Another branch of our experimental work has been the testing of fertilizers upon different crops. This is all the world over a very wide and much unknown field still engaging the best efforts of all the best men of all civilized countries. What shall we say then of Ontario's position as an associate of science and practice. Very many of the most important facts in other lands are clearly inapplicable to us, simply because climatic conditions are so very different. The great regulators of fertilizers, everywhere, are known to be, (1) their form, (2) their mode of application, (3) their time of application, (4) the physicial character of the soil, (5) amount of rainfall, (6) and other climatic conditions ; but principally form, soil, and climate. So then, when will Ontario be able to tell what all her soils, and the ever varying rainfall and temperature by districts, will, on an average, demand to give the best results.

We have made a beginning ; it has taken just seven years to make a beginning, just one rotation in cropping. Less would not have done, more would have done no harm. As it is, we are now able to speak experimentally ; the experimental world and some of its best men have recognized us as one of themselves. In this regard we do not blush to take a place, because, though fruit, in the view of the jealous and impatient, has not been tabled as they think, yet we feel confident of exact aims, of a valuable cause, and of ultimate success far above what can be estimated.

We have made the acquaintance of nitrate of soda, salt, lime, gypsum, phosphate, mineral superphosphate, bone dust, bone superphosphate, and farm-yard manure.

With these, singly, and in combination through some twenty forms, we have made preliminary trials upon the more important field crops. The experience gained to date I can designate by no better term than "puzzling." To say uncertain would not convey my meaning, for I wish to convey something that has been certain in the sense of realizing some things that of themselves were plain enough but *unexpected*. An unexpected thing in our profession is one that comes against the teachings of science on the one hand and what we have to compare with in actual practice on the other hand. Now, science of itself is steady enough, and may be depended upon when the exact conditions exist for its teachings—never otherwise—but when great washings of rain, or very little rain, great heat or unusual cold, and even extremes of physicial conditions of soils pertain, then things puzzle and we do not know where we are. This is especially the case in our individual position as experimentalists in Canada, so all the science and practice we read about from

Europe and the United States where physicial conditions differ so materially from ours are of little use to us either as a guide or in checking results. In one word, so strong and overruling are climatic conditions with us that it will take many years to make a good average suitable to all variations.

I need not say more at present other than to express the hope that the Government will deal liberally, and the country bear patiently, with the farmers' only direct public indulgence—their Experimental Farm.

Our New Experimental Field Plots.

Our old experimental plots having had to be broken up, as explained in the foregoing chapter, it became necessary to establish others. For this purpose field fourteen of the farm has been chosen for the following reasons:—It is the most uniform in exposure and aspect, of any convenient to the College; it is one of our largest fields, almost twenty-four acres, has been recently drained, and possesses soil of three different characters, as shown on the accompanying plan.

In preparation for 1882-83 work, this field was thoroughly fallowed by four ploughings during the past summer, the removal of any obstacles to the plough, the levelling of parts adjoining fences, and the digging of all the ground close to the fences where the plough could not reach. On the north-east side a row of maples has been planted; horse chestnut on the south-east end; mountain ash on the south side, and European lindens on the north-west end, with a view to a certain amount of shelter and ornament.

In considering the sub-division of this field into plots suitable for any purpose, we see no reason to depart from our old area of *one-tenth of an acre*, as to which see my report of 1876. This, of course, implies an easy making of a fifth, or a twentieth, or even a fortieth of an acre, if necessary. The field has been divided into nine ranges, containing each twenty plots, so that there are actually as many as *one hundred and eighty plots.*

Each range is separated by a twenty feet road, and between each plot there is a four and one half feet path. Thus, all over, we think we are up to times in regard to area, form, and position of plots. The form of 132 feet by thirty-three feet lying north-west and south-east is one well adapted to receive the full measure of sunshine—beginning with the morning broadside, the noonday sweep, and the evening touch, each in its largest measure. There is a road over twenty feet in width round the field, between fence and plots. One objection to this form of plot is the greater length of boundary, as against a square—364 feet and 264 feet. It is a well known fact in practice that in any field, plot, or bed, the *outside* plants are stronger, by reason of the better light, air, and sunshine; so then, the greater the boundary line the heavier the crop, proportionately to inside area; this is so plainly a fact in experimental work—often overlooked however—that the difference of one hundred feet to a small area, such as one-tenth of an acre, might over-balance a fine point between two fertilizers, and certainly as one hundred feet is to one-tenth there must be at least 1,000 feet to an acre, and accordingly multiplying to a very serious extent—for experimental accurateness.

There are three distinct classes of soil in our new experimental field; from range two to range five, inclusive, it is a clay loam of average texture, with a yellowish subsoil of a sandy character; the remainder of the field, with the exception of the swampy part—is of a lighter, sharper class, which we call a gravelly loam; and about two and one-half acres, as indicated by the dotted line on plan, are a swamp that has been drained, burned, thoroughly cultivated by ploughing and harrowing, cleaned of all roughness, and is now a spot of virgin soil—never having been cropped—of the vegetable mould type.

Such is our new experimental field proper, on which, in future years, may depend much of the status of Canadian agriculture.

The cropping of those plots has been a matter of some study—just what to do in connection with the existing, or the probable future, requirements of Ontario's rural economy. Of course our past experience has indicated several things, and by reference to what Europe and the United States are doing in the same line, we have concluded upon the following plan:—

FIELD PLOT EXPERIMENTS BEGINNING 1883.

I.—Soils.

Two plots to be divided into eight parts, each to be made up to the depth of two feet with the following soils: (1) Heavy clay; (2) clay loam; (3) loam; (4) sandy loam; (5) swamp; (6) gravelly; (7) marly; (8) sand. These to test manures under the like conditions of management and climate—the physical conditions of soils affecting manures very differently.

II.—Cultivation.

1. Rotations, three sets	One plot to each.
2. Cultivating cereals, say wheat	1 plot.
3. Non-cultivation, "	1 "
4. Subsoiling, "	1 "
5. Drainage, effects of rain in withdrawing manures	2 "

III.—Seeding.

1. Thick seeding	1 plot.
2. Thin "	1 "
3. Drilling "	1 "
4. Broadcast"	1 "
5. Deep "	1 "
6. Shallow "	1 "

IV.—Cropping.

1. Winter wheats, varieties	10 plots.
2. Spring wheats, "	10 "
3. Oats "	10 "
4. Barley "	10 "
5. Rye "	2 "
6. Peas "	3 "
7. Roots—mangolds, turnips, carrots—varieties	11 "
8. Potatoes, varieties	5 "
9. Corn "	4 "
10. Grasses and clovers, separately	20 "
11. Green fodders	6 "
12. Permanent pastures, various mixtures	3 "
13. Sundry crops	2 "
14. Sugar beet	1 "
15. Sugar cane	2 "
16. Crop after crop of wheat upon virgin soil (clay loam)	2 "

V.—Unmanured Plots.

Unmanured plots	4

VI.—Manuring.

1. Farm-yard manure, best management of, from uncovered court	1 plot.
2. Farm-yard manure from covered court	1 "
3. Farm-yard manure from poorly fed animals	1 "
4. Farm-yard manure from well fed animals	1 "
5. Fertilizing by sheep (diff. soils)	2 "
6. Farm-yard liquid (diff. soils)	2 "
7. Clean straw, rotting on surface	1 "

8.	Clean straw, ploughed under	1 plot.
9.	Compost (diff. soils)	2 "
10.	Clover (diff. soils)	2 "
11.	Bare fallow (diff. soils)	2 "
12.	Sewage from College (diff. soils)	2 "
13.	Marl (old and new)	2 "
14.	Phosphate (apatite)	1 "
15.	Superphosphate	1 "
16.	Bones, fine ground	1 "
17.	Bone superphosphate	1 "
18.	Gypsum	1 "
19.	Leached ashes	1 "
20.	Lime (var. soils)	1 "
21.	Salt (var. soils)	2 "
22.	Mixtures of several manures	5 "
23.	Various *quantities* of several manures	5 "
24.	*Special* manures	3 "
25.	Fall *vs.* spring manuring	4 "
26.	Manures applied at various stages of growth, same season	2 "
27.	Duplications of several	5 "
28.	Nitrate of soda	

VII.—Modes of preventing and curing diseases of farm crops.

VIII.—Special nitrogen experiments, as fully and ably explained in the following letter from our chemist, Dr. Hare :—

Sir,—It has been at the request of Prof. Brown that I have become an associate with him in the direction of the field experiments of the Ontario Experimental Farm, and that I now submit for your consideration the following suggestions with regard to the *system of fertilizing* to be used in connection therewith. A study of the field experiments lately published by Lawes and Gilbert, of England, and by the experimental stations of Germany and the United States, has led me to consider a system of *coöperative experimenting* as the only one that can hope to secure general, definite and abiding results. The system of coöperative experimenting to be truly successful should provide that the fertilizing materials may be used separately, two by two, and altogether. It is by this method only that the effects of the ingredients separately and the capacity of the soil to supply them, as well as the *heightened effect* on the one fertilizer by the addition of other fertilizers may be accurately discovered. A most careful examination of the physical and chemical character of the soil should precede and accompany the experiments in order, if possible, exactly to formulate the effects of the fertilizer and the feeding capacities of different plants. Assisted by Prof. Brown, four cross-sections of surface soil and subsoil, from characteristic portions of the experimental field, have been made. We have already begun an analysis of them, which we propose, with the analyses of some of the experimental crops, publishing in next year's report.

We are in full accord with Prof. W. O. Atwater's system of coöperative experimenting as submitted to the Department of Agriculture, Washington, D. C., March 27th, 1882, under the heading, "Coöperative Experimenting as a Means of Studying the Effects of Fertilizers and the Feeding Capacities of Plants." Prof. Atwater has proposed this system as the *best practical* explanation man can give of the two important subjects which were discussed at the Washington Convention for coöperative experiment. The questions were :—

(1) The supply of nitrogen to plants.
(2) The action of phosphoric acid in different forms of combination and in different fertilizing materials upon the growth of plants. The action of nitrogenous and phosphatic fertilizers (potassic as well) upon the growth of plants is really the great agricultural question of to-day.

I.—The Supply of Nitrogen to Plants.

We think with Prof. Atwater that a dressing of 450 pounds of nitrate of soda per acre, probably as large as would be used in this country, in ordinary practice, on ordinary crops. We have adopted this maximum, "full ration," which at sixteen per cent. would contain seventy-two pounds of nitrogen, and the divisions of it into two-thirds, one-third, one-sixth, and one-twelfth rations.

Nitrogen Rations.

(*a*) One-twelfth ration : Nitrate of soda 38 pounds, with 6 pounds of nitrogen.
(*b*) One-sixth ration : Nitrate of soda 75 pounds, with 12 pounds of nitrogen.
(*c*) One-third ration : Nitrate of soda 150 pounds, with 24 pounds of nitrogen.
(*d*) Two-thirds ration : Nitrate of soda 300 pounds, with 48 pounds of nitrogen.
(*e*) Full ration : Nitrate of soda 450 pounds, with 72 pounds of nitrogen.

As nitrogen exists in different forms, and each form may have a distinct action upon the growth of plants (under the varying conditions of crop, soil, climate, season, etc., etc.), the question of the supply of nitrogen to plants is only answered when the *feeding capacities* of different plants to nitrogen in all its forms are carefully studied and accurately formulated. We give Prof. Atwater's classification of the important kinds of fertilizers containing nitrogen :—

I.—Nitric Acid : (*a*) Nitrate of soda.
(*b*) Nitrate of potash.

II.—Ammonia : (*a*) Sulphate of Ammonia.

III.—Organic Nitrogen : (*a*) Dried blood.
(*b*) Meat scrap.
(*c*) Fish scrap and fish guano.
(*d*) Leather scraps.

We have concluded to take :

For Nitric Acid—Nitrate of soda with 16 per cent. nitrogen ;
For Ammonia—Sulphate of ammonia with 21 per cent. nitrogen ;
For Organic Nitrogen—Dried blood (steam dried) with 11 per cent. nitrogen.

The "nitrogen mixture," consisting of equal parts of nitrate of soda (16 per cent. nitrogen), sulphate of ammonia (21 per cent. nitrogen), and dried blood (11 per cent. nitrogen), and containing 16 per cent. nitrogen, we shall also use. These four kinds of nitrogenous fertilizers with the quantities per acre, as suggested by Prof. Atwater, will require twenty different experimental plots. By making the plots one-twentieth of an acre each, one acre will serve the four groups. The four groups with the quantities per acre will be as follows :—

—	Ration.	Nitrate of Soda	Per cent. of Nitrogen.	Quantity of Nitrogen.
		Pounds.		
I.—Nitrate of Soda group.	One-twelfth	38	16	6
	One-sixth	75		12
	One-third	150		24
	Two-thirds	300		48
	Full	450		72

—	Ration.	Sulphate of Ammonia.	Per cent. of Nitrogen.	Quantity of Nitrogen.
		Pounds.		
II.—Sulphate of Ammonia group.	One-twelfth	29	21	6
	One-sixth	57		12
	One-third	114		24
	Two-thirds	228		48
	Full	343		72

—	Ration.	Dried Blood.	Per cent. of Nitrogen.	Quantity of Nitrogen.
		Pounds.		
III.—Dried blood group.	One-twelfth	55	11	6
	One-sixth	110		12
	One-third	220		24
	Two-thirds	440		48
	Full	660		72

—	Ration.	Nitrogen Mixture.	Per cent. of Nitrogen.	Quantity of Nitrogen.
		Pounds.		
IV.—"Nitrogen Mixture" group.	One-twelfth	38	16	6
	One-sixth	75		12
	One-third	150		24
	Two-thirds	300		48
	Full	450		72

II. In reference to the second question, "The action of phosphoric acid in different forms of combination, and in different fertilizing materials upon the growth of plants," a course similar to the one we have indicated for the nitrogen will be followed. We think that the action of *soluble phosphoric* acid, *precipitated phosphoric* acid, and *insoluble phosphoric* acid upon the growth of plants must be ascertained separately before this most important question can be answered, or a correct comparison of the relative value of these forms of phosphoric acid can be given. For the *soluble* phosphoric acid, Prof. Atwater suggests: "Dissolved bone black with 16 per cent. $P_2 O_5$; or high-grade Superphosphate with 32 per cent. $P_2 O_5$;" for the precipitated *phosphoric* acid, "A high-grade superphosphate with equal weight of chalk, making a precipitated phosphate, with 16 per cent. $P_2 O_5$;" for *insoluble phosphoric* acid, "Fine bone dust (mesh, 40) from steamed or raw bone, with 25 per cent. $P_2 O_5$; or mineral phosphate with 25 per cent. $P_2 O_5$."

We give a slightly enlarged statement of Prof. Atwater's scheme for the phosphoric acid group, with the quantities per acre :—

Quantities of Phosphoric Acid.

——	Ration.	Dissolved bone black.	Per cent. $P_2 O_5$	Quantity $P_2 O_5$
		Pounds.		
I.—Soluble Phos-	One-sixth	100		16
phate group.	One-third	200	16	32
(Superphosphates).	Two-thirds	400		64
	Full	600		96
——	Ration.	Precipitated Phosphoric Acid	Per cent. $P_2 O_5$	Quantity $P_2 O_5$
		Pounds.		
II.—Precipitated	One-sixth	100		16
Phosphate	One-third	200	16	32
group.	Two-thirds	400		64
	Full	600		96
——	Ration.	Fine steamed or raw bone.	Per cent. $P_2 O_5$	Quantity $P_2 O_5$
		Pounds.		
III.—Insoluble	One-sixth	67		16
Phosphate group	One-third	133	25	32
(*a*) Ground bone.	Two-thirds	267		64
	Full	400		96
——	Ration.	Mineral Phos- phate, finely powdered.	Per cent. $P_2 O_5$	Quantity $P_2 O_5$
		Pounds.		
IV.—Insoluble	One-sixth	67		16
Phosphate group	One-third	133	25	32
(*b*) Mineral Phos-	Two-thirds	267		64
phate,	Full	400		96
finely powdered.				

III.—The Potash Group.

Taking for the minimum of muriate of potash, 17 pounds per acre, and for a maximum 200 pounds per acre, and dividing as before, we shall have :—

—	Ration.	Muriate of Potash.	Quantity of Potash.
		Pounds.	
Muriate of Potash group.	One-sixth	33	17
	One-third	67	33
	Two-thirds	133	67
	Full	200	100

The phosphoric acid group and the potash group will require twenty plots—phosphoric acid group sixteen plots, and the potash group four plots. If the plots be made $\frac{1}{20}$ of an acre each, an acre will accomodate these two elementary groups.

Complete Fertilizers.

It is possible, that a mixture of superphosphate and potash must be added to the nitrogenous materials, before the full effect of the nitrogen becomes manifest. This being so, we shall follow the suggestion of Prof. Atwater, and take two-thirds rations of superphosphate and muriate of potash (400 pounds of superphosphate and 133 pounds of muriate of potash), and add them to the several rations of the nitrogen group :—

—	Fertilizing Materials.			Ingredients.					
I.—Nitrate of Soda mixed group.	Nitrate of Soda. pounds per acre.	Superphosphate pounds per acre.	Muriate of Potash pounds per acre.	Nitrogen pounds per acre.	Phosphoric Acid pounds per acre.	Potash pounds per acre.	Nitrogen per cent.	Phosphoric Acid per cent.	Potash per cent.
Ration.									
One-twelfth	38	400	133	6	64	67	1.5	11.2	11.7
One-sixth	75	400	133	12	64	67	2.0	10.5	11.0
One-thirds	156	400	133	24	64	67	3.5	9.3	9.8
Two-thirds	300	400	133	48	64	67	5.8	7.6	8.0
Full	450	400	133	72	64	67	7.3	6.5	6.8

—	Fertilizing Materials.			Ingredients.					
II.—Ammonia Sulphate mixed group. Ration.	Sulphate of Ammonia pounds per acre.	Superphosphate pounds per acre.	Muriate of Potash pounds per acre.	Nitrogen pounds per acre.	Phosphoric Acid pounds per acre.	Potash pounds per acre.	Nitrogen per cent.	Phosphoric Acid per cent.	Potash per cent.
One-twelfth	29	400	133	6	64	67	1.0	11.2	11.7
One-sixth	57	400	133	12	64	67	2.0	10.5	11.0
One-third	114	400	133	24	64	67	3.6	9.3	9.8
Two-thirds	228	400	133	48	64	67	5.8	7.6	8.0
Full	343	400	133	72	64	67	7.3	6.5	6.8

—	Fertilizing Materials.			Ingredients.					
III.—Organic Nitrogen. mixed group. Dried blood. Ration.	Dried Blood pounds per acre.	Superphosphate pounds per acre.	Muriate of Potash pounds per acre.	Nitrogen pounds per acre.	Phosphoric Acid pounds per acre.	Potash pounds per acre.	Nitrogen per cent.	Phosphoric Acid per cent.	Potash per cent.
One-twelfth	55	400	133	6	64	67	1.5	11.2	11.7
One-sixth	110	400	133	12	64	67	2·0	10.5	11.0
One-third	220	400	133	24	64	67	3.5	9.3	9.8
Two-thirds	440	400	133	48	64	67	5.8	7.6	8.0
Full	660	400	133	72	64	67	7.3	6.5	6.8

—	Fertilizing Materials.			Ingredients.					
IV.—"Nitrogen Mixture" mixed group. Ration.	"Nitrogen Mixture" pounds per acre.	Superphosphate pounds per acre.	Muriate of Potash pounds per acre.	Nitrogen pounds per acre.	Phosphoric Acid pounds per acre.	Potash pounds per acre.	Nitrogen per cent.	Phosphoric Acid per cent.	Potash per cent.
One-twelfth	38	400	133	6	64	67	1.5	11.2	11.7
One-sixth	75	400	133	12	64	67	2.0	10.5	11.9
One-third	150	400	133	24	64	67	3.5	8.3	9.8
Two-thirds	300	400	133	48	64	67	5.8	7.6	8.0
Full	450	400	133	72	64	67	7.3	6.5	6.8

This set will require twenty plots. By making the plots one-twentieth of an acre each, one acre will serve the experiment.

Another set of experiments is needed to ascertain if the action of *soluble* and *insoluble* phosphoric acid and of muriate of potash upon the growth of plants is increased by the addition of "Complete Fertilizers."

—	Fertilizing Materials.			Ingredients.					
I.—Superphosphate mixed group.	Superphosphate pounds per acre.	"Nitrogen Mixture" pounds per acre.	Muriate of Potash pounds per acre.	Phosphoric Acid pounds per acre.	Nitrogen pounds per acre.	Potash pounds per acre.	Phosphoric Acid per cent.	Nitrogen per cent.	Potash per cent.
Ration.									
One-sixth	100	300	133	16	48	67	3.0	9.0	12.6
One-third	200	300	133	32	48	67	5.1	7.6	10.6
Two-thirds	400	300	133	64	48	67	7.7	5.7	8.0
Full	600	300	133	96	48	67	9.4	4.6	6.5

—	Fertilizing Materials.			Ingredients.					
II.—Insoluble Phosphoric Acid mixed group.	Fine bone or Mineral Phosphate pounds per acre.	"Nitrogen Mixture" pounds per acre.	Muriate of Potash pounds per acre.	Phosphoric Acid pounds per acre.	Nitrogen pounds per acre.	Potash pounds per acre.	Phosphoric Acid per cent.	Nitrogen per cent.	Potash per cent.
Ration.									
One-sixth	67	300	133	16	48	67	3.2	9.6	13.4
One-third	103	300	133	32	48	67	5.7	8.5	11.9
Two-thirds	267	300	133	64	48	67	9.1	6.9	9.6
Full	400	300	133	96	48	67	11.5	5.8	8.1

—	Fertilizing Materials.			Ingredients.					
III.—Muriate of Potash mixed group.	Muriate of Potash pounds per acre.	"Nitrogen Mixture" pounds per acre.	Superphosphate pounds per acre.	Potash pounds per acre.	Nitrogen pounds per acre.	Phosphoric Acid pounds per acre.	Potash per cent.	Nitrogen per cent.	Phosphoric Acid per cent.
Ration.									
One-sixth	33	300	400	17	48	64	2.3	6.6	8.7
One-third	67	300	400	33	48	64	4.3	6.2	8.5
Two-thirds	133	300	400	67	48	64	8.0	5.8	7.7
Full	200	300	400	100	48	64	11.1	5.3	7.1

For this set of experiments with complete fertilizers, twelve plots will be needed—eight plots for the soluble and insoluble phosphoric acid, and four for the muriate of potash.

By making the plots one-twentieth of an acre each, eight plots of the acre will remain unoccupied, four of which can be left unmanured, and four treated with farm-yard manure. It will be seen, from an addition of all the plots, that four acres will be just sufficient for the entire course of experiments, embracing partial fertilizers, and complete fertilizers.

Arranged in order they would be briefly as follows:—

I.—Partial Fertilizers.

The object of which being to test the effects of ingredients separately, and the capacity of the soil to supply them.

(*a*) *Nitrogen Set.*

1. Nitrate of soda group in five rations ..... 5 plots.
2. Sulphate of ammonia group in five rations ..... 5 "
3. Dried blood group in five rations ..... 5 "
4. "Nitrogen mixture" group in five rations ..... 5 "
5. No manure ..... 1 "
6. Farm-yard manure ..... 1 "

(*b*) *Phosphoric Acid Set.*

7. Soluble phosphoric acid group in four rations ..... 4 plots.
8. Precipitated phosphoric acid group in four rations ..... 4 "
9. Insoluble phosphoric acid group—
   (*i*) Fine bone in four rations ..... 4 "
   (*ii*) Mineral phosphate in four rations ..... 4 "

(*c*) *Muriate of Potash Set.*

10. Muriate of potash in four rations ..... 4 "
11. No manure ..... 1 "
12. Farm-yard manure ..... 1 "

II.—Complete Fertilizers.

"Mixed minerals" mean superphosphate and muriate of potash, each in $\frac{2}{3}$ rations

(*a*) *Nitrogen Set.*

1. Nitrate of soda with mixed minerals in five rations ..... 5 plots.
2. Sulphate of ammonia with mixed minerals in five rations .... 5 "
3. Dried blood with mixed minerals in five rations ..... 5 "
4. "Nitrogen mixture" with mixed minerals in five rations .... 5 "
5. No manure ..... 1 "
6. Farm-yard manure ..... 1 "

(*b*) *Phosphoric Acid Set.*

"Basal mixture" means "nitrogen mixture" and muriate of potash, each in $\frac{2}{3}$ ration.

7. Superphosphate with basal mixture in four rations ..... 4 plots.
8. Fine bone or mineral phosphate with basal mixture in four rations ..... 4 "

(*c*) *Muriate of Potash Set.*

9. Muriate of potash with $\frac{2}{3}$ ration of superphosphate and "nitrogen mixture" in four rations ..... 4 plots.
10. No manure ..... 1 "
11. Farm-yard manure ..... 1 "

If nitrogen be taken in three groups, nitric acid, ammonia, and organic nitrogen, with three rations instead of five, $\frac{1}{3}$, $\frac{2}{3}$, and full ration, it will become possible to increase the chemical conditions of the experiment, and yet at the same time to condense the experimental plots needed to forty on an area of two acres. The increase of chemical conditions will consist in using the fertilizing materials not only separately and altogether, but two by two.

The first *acre set*, for one-twentieth acre plots, will serve nitrogen and muriate of potash; the second acre set, for one-twentieth acre plots, the phosphoric acid.

1st Acre Set—(*a*) Nitrogen Set.

No.	FERTILIZERS.	Quantities per $\frac{1}{10}$ acre plots.
	I.—*Preliminary Group.*	Pounds.
1.	Nitrate of soda, two-third ration	15.0
2.	Superphosphate " "	20.0
3.	Muriate of potash " "	6.7
4.	Nitrate of soda " "	15.0
	Superphosphate " "	20.0
5.	Nitrate of soda " "	15.0
	Muriate of potash " "	6.7
6.	Superphosphate } Mixed minerals	20.0
	Muriate of potash }	6.7
	II.—*Nitrate of Soda Group.*	
7.	Mixed minerals as No. 6	26.7
	Nitrate of soda, one-third ration	7.5
8.	Mixed minerals as No. 6	26.7
	Nitrate of soda, two-thirds ration	15.0
9.	Mixed minerals as No. 6	26.7
	Nitrate of soda, full ration	22.5
	III.—*Sulphate of Ammonia Group.*	
10.	Mixed minerals No. 6	26.7
	Sulphate of ammonia, one-third ration	5.6
11.	Mixed minerals as No. 6	26.7
	Sulphate of ammonia, two-thirds ration	11.3
12.	Mixed minerals as No. 6	26.7
	Sulphate of ammonia, full ration	16.8
	IV.—*Dried Blood Group.*	
13.	Mixed minerals as No. 6	26.7
	Dried blood, one-third ration	11.0
14.	Mixed minerals as No. 6	26.7
	Dried blood, two-thirds ration	22.0
15.	Mixed minerals as No. 6	26.7
	Dried blood, full ration	33.0
	(*b*) *Muriate of Potash Set.*	
16.	Mixed minerals as No. 6	26.7
	Muriate of potash, one-third ration	3.4
17.	Mixed minerals as No. 6	26.7
	Muriate of potash, two-thirds ration	6.7
18.	Mixed minerals as No. 6	26.7
	Muriate of potash, full ration	10.0
19.	No manure	....
20.	Farm-yard manure	....

2ND ACRE SET—(*a*) PHOSPHORIC ACID SET.

No.	FERTILIZERS.	Quantities per $\frac{1}{20}$ acre plots.
	I.—*Preliminary Group.*	Pounds.
1.	"Nitrogen mixture," two-thirds ration	15.0
2.	Superphosphate " "	20.0
3.	Muriate of potash " "	6·7
4.	Nitrogen mixture	15.0
	Superphosphate	20.0
5.	Muriate of potash	6.7
	Superphosphate	20.0
6.	Nitrogen mixture Muriate of potash } Basal mixture	15.0 6.7
	II.—*Soluble Phosphoric Acid Group.*	
7.	Basal mixture	21.7
	Dissolved bone black, one-third ration	10.0
8.	Basal mixture	21.7
	Dissolved bone black, two-thirds ration	20.0
9.	Basal mixture	21.7
	Dissolved bone black, full ration	30.0
	III.—*Precipitated Phosphoric Acid Group.*	
10.	Basal mixture	21.7
	Precipitated phosphate, one-third ration	10.0
11.	Basal mixture	21.0
	Precipitated phosphate, two-thirds ration	20.0
12.	Basal mixture	21.7
	Precipitated phosphate, full ration	30.0
	IV.—*Insoluble Phosphoric Acid Group, in form of fine bone or finely powdered Mineral Phosphate.*	
13.	Basal mixture	21.7
	Bone dust or mineral phosphate, one-third ration	10.0
14.	Basal mixture	21.7
	Bone dust or mineral phosphate, two-thirds ration	20.0
15.	Basal mixture	21.7
	Bone dust or mineral phosphate, full ration	30.0
	(*b*) *Sulphate of Lime Group.*	
16.	Basal mixture	21.7
	Sulphate of lime, one-third ration	3.8
17.	Basal mixture	21.7
	Sulphate of lime, two-thirds ration	7.5
18.	Basal mixture	21.7
	Sulphate of lime, full ration	11.3
19.	No manure	....
20.	Farm-yard manure	....

In this condensed form of Prof. Atwater's scheme of coöperative experimenting, nitrogen, phosphoric acid, and potash are used separately in two-thirds rations upon six plots, two plots each. They are then combined two by two in two-thirds rations, and, lastly, two-thirds of two of them are added in turn to one-third, two-thirds, and full rations of the other. The sulphate of lime group has been suggested in order to ascertain if the effect of the superphosphate be due in part to the sulphate of lime always present in it. This system of fertilizing makes it possible for an experimenter accurately to determine the effect of the fertilizers separately, and, accordingly, the capacity of the soil to supply them, and, also, the increased effect given to one by the addition of the others. Our ordinary crops—wheat, barley, rye, oats, grass, clover, onions, potatoes, turnips, etc. —should be tried by the same system of experimenting, in order that the feeding capacities of each, both as regards the natural supply of plant food and the artificial, may become clearly manifest.

Very respectfully,

R. B. Hare,
Prof. Chemistry, O. A. C.

THE LIVE STOCK EXPERIMENTS OF 1882.

We are still prosecuting the enquiry of what kinds of grain give most rapid and cheapest results in the fattening of cattle under three years old—knowing that it is only by a multiplication of experiments that reliable information can be gathered for the guidance of the average farmer. Since the issue of our last Advance Report on this subject a very wide and keen interest has been evolved throughout the Dominion, with commendatory notices from England, the United States, and elsewhere, so that we are not yet allowed to call "enough."

In addition to beef production, the newer, and probably less understood, subject of what mutton and wool are best for the great markets of the world has been receiving our further attention, and in this regard I have pleasure in submitting a most important addition to scientific observations from the pen of Professor McMurrich, of this College, whose position as a careful and practical manipulator is already well known in the United States and Canada. It is somewhat remarkable that since Youatt's discovery of the serrations on wool, hardly anything has been added for the guidance of manufacturers, and as wool is a crop that changes materially under conditions of soil, climate, and management, it is our duty to make examinations in this direction, especially in view of the increasing importance of sheep husbandry.

I have been so often asked for copies of my letter to you in 1878, entitled "Canadian Beef for Britain," that I submit a revised copy of it under a new name.

I.—CORN IN CATTLE FATTENING.

First Experiment.

From 12th April to 25th June, 1881, three three-year-old steers were fed upon hay, bran, roots, and corn. Quantities of food and increase of growth in this and all other cases refer to the *average per head.*

Food consumed by one animal during seventy-five days :—

	lbs.
Roots	4125
Bran	50
Hay and green fodder	1022
Corn	657

Result in increased weight :—

	lbs.
Weight of animal on entry	1163
Weight at finish	1271
Increase	108
Daily increase	1·44

Second Experiment.

From 1st November to 25th December, 1881, three yearling steers received the following average per head :—

Food consumed during fifty-six days :—

	lbs.
Roots	2280
Bran	100
Hay	715
Corn	414

Result in increased weight :—

	lbs.
Weight of animal on entry	907
Weight at finish	1040
Increase	133
Daily increase	2·37

Third Experiment.

From 26th December, 1881, to 19th February, 1882, three steers, changing from yearlings to two-year-olds, received the following average per head :

Food consumed during fifty-six days :—

	lbs.
Roots	2118
Bran	118
Hay	736
Corn	566

Result in increased weight :—

	lbs.
Weight of animal on entry	1098
Weight at finish	1208
Increase	110
Daily increase	1·96

Fourth Experiment.

From the 20th February to 16th April, 1882, three two-year-old steers consumed per head, on an average, as follows :

Food consumed during fifty-six days :—

	lbs.
Roots	1220
Bran	120
Hay	618
Corn	606

Result in increased weight :—

	lbs.
Weight of animal on entry	1100
Weight at finish	1205
Increase	105
Daily increase	1·87

ABSTRACT OF EXPERIMENTS WITH CORN.

Food consumed by one animal during 243 days :—

	lbs.
Roots	9743
Bran	388
Hay	3091
Corn	2243

Result in increased weight during average of sixty-one days :—

	lbs.
Average weight of animal on entry	1067
" " " at finish	1181
" increase	114
Daily increase	1.91

II.—PEAS IN CATTLE FATTENING.

First Experiment.

From 12th April to 25th June, 1881, three three-year-old steers were fed on peas as a test grain.

Food consumed by one animal in seventy-five days :—

	lbs.
Roots	4125
Bran	50
Hay	1022
Peas	657

Result in increased weight :—

	lbs.
Weight of animal at entry	1243
Weight at finish	1388
Increase	145
Daily increase	1.94

Second Experiment.

From 1st November to 25th December, 1881, three yearling steers received the following average per head :—

Food consumed during fifty-six days :—

	lbs.
Roots	2370
Bran	106
Hay	755
Peas	463

Result in increased weight :—

	lbs.
Weight of animal on entry	958
Weight at finish	1098
Increase	140
Daily increase	2.50

Third Experiment.

From 26th December, 1881, to 19th February, 1882, three steers, changing from yearlings to two-year-olds, received the following average per head :

Food consumed during fifty-six days :—

	lbs.
Roots	1674
Bran	115
Hay	633
Peas	551

Result in increased weight :—

	lbs.
Weight of animal on entry	1010
Weight at finish	1100
Increase	90
Daily increase	1.61

Fourth Experiment.

From 20th February to 16th April, 1882, three two-year-old steers consumed per head on an average as follows :

Food consumed during fifty-six days :—

	lbs.
Roots	1211
Bran	129
Hay	654
Pease	626

Result in increased weight :—

	lbs.
Weight of animal on entry	1097
Weight at finish	1169
Increase	72
Daily increase	1.27

ABSTRACT OF EXPERIMENTS WITH PEAS.

Food consumed by one animal during 243 days :—

	lbs.
Roots	9380
Bran	400
Hay	3064
Peas	2297

Result in increased weight during average of sixty-one days :—

	lbs.
Average weight of animal on entry	1077
" " " at finish	1189
Average increase	112
Daily increase	1.83

III.—OATS IN CATTLE FATTENING.

First Experiment.

From 12th April to 25th June, 1881, three three-year-old steers were fed on oats.

Food consumed by one animal in seventy-five days :—

	lbs.
Roots	4125
Bran	50
Hay	1022
Oats	657

Result in increased weight :—

	lbs.
Weight of animal on entry	1301
Weight at finish	1411
Increase	110
Daily increase	1.47

Second Experiment.

From 1st November to 25th December, 1881, three yearling steers received the following average per head :

Food consumed during fifty-six days :—	lbs.
Roots	2290
Bran	101
Hay	618
Oats	447

Result in increased weight :—	lbs.
Weight of animal on entry	888
Weight at finish	1009
Increase	121
Daily increase	2.16

Third Experiment.

From 26th December, 1881, to 19th February, 1882, three steers, changing from yearlings to two-year-olds, received the following average per head :

Food consumed during fifty-six days :—	lbs.
Roots	2036
Bran	114
Hay	698
Oats	508

Result in increased weight :—	lbs.
Weight of animal on entry	1040
Weight at finish	1121
Increase	81
Daily increase	1.44

Fourth Experiment.

From 20th February to 16th April, 1882, three two-year-old steers consumed per head on an average as follows :

Food consumed during fifty-six days :—	lbs.
Roots	1469
Bran	126
Hay	682
Oats	655

Result in increased weight :—	lbs.
Weight of animal on entry	1208
Weight at finish	1288
Increase	80
Daily increase	1.43

ABSTRACT OF EXPERIMENT WITH OATS.

Food consumed by one animal during 243 days :—	lbs.
Roots	9833
Bran	391
Hay	3020
Oats	2267

Result in increased weight during average of sixty-one days :—	lbs.
Average weight of animal on entry	1109
" " " at finish	1207
Average increase	98
Average daily increase	1.60

IV.—COMPARATIVE RESULTS WITH CORN, PEAS AND OATS, IN CATTLE FATTENING.

Twelve different experiments, exchanged with three different sets of animals, carefully conducted in every respect as regards equal conditions of management, weighings, uniform selection of animals, and weather influences, should give some clear indications of what certain foods are capable of doing in the production of young beef. This is no case of leaving anything undone; no guessing, no irregularity in anything, but an uniform and systematic production of facts in every respect.

The sum and substance of the whole series is thus briefly stated :—	lbs.
Corn has given a daily increase per head of	1.91
Peas " " "	1.83
Oats " " "	1.60

As will be observed, the quantities of food consumed were practically alike in each case, so that the only remaining question is price of *grain*. This varies much every season, and may, therefore, be left to those interested, with the note that, at the proper time of the year, corn, peas and oats can be had and laid past in quantity, at *one cent per pound* each, namely : 56 cents per bushel for corn, 60 for pease, and 34 for oats. Taking this view, which of them has produced the cheapest beef ?

Corn—2243 lbs.	gave	464 lbs.	increase at a	cost of	$4\frac{8}{10}$ c. per lb.
Peas— 2297	"	445	"	"	$5\frac{2}{10}$ c. "
Oats— 2267	"	389	"	"	$5\frac{8}{10}$ c. "

Or, in finishing an average steer from 1st October to 1st June, the cost for grain would be :—

By corn	$20 75
By peas	22 50
By oats	25 10

Which with 1000 head of cattle is,—

Corn	$2075
Pease	2250
Oats	2500

Comment is unnecessary, though the end is not yet.

V.—OILCAKE IN CATTLE FATTENING.

After the feeding experiments just recorded, we set aside two batches, of three head each, of the same cattle, for the purpose of ascertaining whether *one-half* the quantity of

grain in the form of Linseed cake (usually called "Oilcake") as one of our high class foods, or Cottonseed cake, as another, would, alone and separately, uphold the animal system as effectually as the mean of corn, peas, and oats had done. In order to eliminate all interference by other stuffs and yet give life a fair chance, neither bran, roots, nor any other food whatever, except hay, was allowed. At the same time, in order not to make the change too rapid, we gave one week on reduced corn, oats, and peas, previous to beginning this experiment.

The experiment began on the 4th May, and ended 7th June—making 34 days, each batch of cattle being changed at half time from Oilcake to Cottonseed, and from Cottonseed to Oilcake, so that we are really handling four in place of two experiments.

Food consumed per head :—

Hay, 618 lbs., or 18 lbs. per day.
Cake, 151 " $4\frac{1}{2}$ "

Result :—

	lbs.
Average weight per head on entry	1161
" " at finish	1184
Increase	23
Daily increase	$\frac{2}{3}$

VI.—COTTONSEED CAKE IN CATTLE FATTENING.

This was conducted under precisely similar circumstances as the Oilcake, and with the same object in view, so that all required here is to record quantities of hay and cake consumed, and state results.

Food consumed per head :—

Hay, 595 lbs., or 17 lbs. per day.
Cake, 160 " $4\frac{7}{10}$ "

Result :—

	lbs.
Average weight per head on entry	1175
" " at finish	1173
Decrease for the period	2

VII.—COMPARATIVE RESULTS IN FATTENING CATTLE WITH OILCAKE AND COTTONSEED CAKE.

The diary of these does not show anything as having occurred to interfere with regularity of progress. At first the animals did not eat the Cottonseed cake so freely, and they drank considerably more water than those upon Oilcake.

In criticizing the results, attention is first directed to quantities of food consumed, as to which it appears that the slightly lighter stamp of animals eat one pound less hay and one-half pound less cake per day than those upon Cottonseed cake. Much stress cannot be placed on this, other than to remember that the least food with the lighter animals gave the best results, which, so far as we are able to judge, must be attributed to influence of *kind of food.*

Practically, Linseed cake gave a daily increase of two-thirds of a pound, and Cottonseed cake just held its ground and no more ; that is, it made no increase, nor did it allow the animals to fall off during thirty-four days.

The best lesson in these facts is, in my opinion, that these cakes have been able to maintain the animals so long, especially following the very liberal supply of corn, peas, oats, bran, roots, and hay. The two forms of feeding stand thus financially :

Daily consumption per head :—

	lbs.		lbs.
Hay	10	Hay	$17\frac{1}{2}$
Roots	40	Cake	$4\frac{1}{2}$
Bran	$2\frac{1}{2}$		
Corn, peas, oats	11		
	$63\frac{1}{2}$		22
Cost 24 cents.		Cost 16 cents.	

Result :—

lbs.	
Increase of $1\frac{3}{4}$	No increase, nor loss.

So it is something to say that twenty-two pounds of two things gave no increase at a cost of sixteen cents, and that sixty-three and a half pounds of six things gave one and three-quarter pounds increase at a cost of twenty-four cents, or thirteen and a half cents per pound. This does not by any means show so much against cake and hay, because the chemist may step in and say that, according to nutritive value, they have done as much, and may-be more, than the others.

I respectfully submit these to the opinion of Sir J. B. Lawes, of Rothamstead, England.

VIII.—THE MICROSCOPIC EXAMINATION OF TWELVE KINDS OF WOOL GROWN ON THE ONTARIO EXPERIMENTAL FARM.

I think it is safe to say that, excepting where undertaken as a specialty on the large scale, the growth of wool is yet very much a matter of subordinate importance in connection with the mixed farming of any country. Superior and extensive cultivation of crops under rotation has not recognized with its mutton production what the wool should be, except as one of so many pounds per head. The best farmer of such conditions is generally a breeder of thoroughbred cattle and some sheep ; the medium farmer a fattener of cattle and some sheep, and the third-rate farmer a miserable imitator of both. As the home of the thoroughbred, therefore, mixed husbandry has necessarily been indifferent to wool other than demanded by particular standards of breeds—per the ram especially. The question of producing the largest quantity of a certain kind of wool for a particular market has not troubled the arable area to any extent anywhere. But why should this be so ? If it is not just as much a thing of value *per acre* as any other crop, then it is not worth growing. When any farmer is not a breeder of thoroughbreds, there cannot possibly exist any reason for inattention to wool to suit the ruling market of the time, subject of course to conditions appropriate to the best results. Canada is just beginning to realize this part of her duty ; and, in view of the great field thus opening, I think it well that our work here should show the nature of the product so far as it lies outside the reach of ordinary hands. I refer to the structure of wool as exhibited under the microscope. I know of no publication, scientific or otherwise, that does this with the leading breeds of sheep and their crosses, as bred and matured under *precisely similar conditions*. It is well known that the character of wool is materially affected by climate, soil, and management ; and consequently, while we have access to some facts applicable to a particular breed in a particular part of the world, they cannot serve as a guide for a provincial purpose so much as when the facts are being gathered, as in our special circumstances. Then, again, it is not alone the knowledge of the pure breeds that is thus required ; it is just as essential, if not more so, that the grower of wool be conversant with the powers of the thoroughbreds over the commoners of their kinds, for through such a source alone can we look for cheapness of produce. It is no boast that this farm is well up in breeds of sheep, and that particular attention has been paid to the question of mutton and wool for the markets of the world.

Without further introduction, I have now pleasure in submitting the following letter from Professor McMurrich, our skilled Microscopist, upon which I propose to make some remarks from a practical farmer's standpoint :—

"Ontario Agricultural College,
"May 31st, 1881.

"Professor Brown:

"Dear Sir,—Having lately been engaged, at your request, in making a microscopical examination of a number of specimens of wool taken from sheep of various breeds, with a view to ascertaining the diameter and number of imbrications to the inch in each breed, I desire now to present to you a report of my observations.

"I was furnished with specimens of wool from a Southdown, Southdown Grade, Leicester, Leicester Grade, Oxford Down, Oxford Down Grade, Canadian, Shropshire Down, Shropshire Down Grade, Merino, and Merino Grade. Of the Shropshire Down, Southdown, Southdown Grade, and Oxford Down wools I was given specimens from two individuals; of the wools of other varieties I was obliged to content myself with a specimen from a single sheep.

"My method of investigation was as follows:—Having made a temporary microscopical preparation of a wool, I examined it with a Zeiss objective D. and ocular 4, giving a magnifying power of 440 diameters. With this power I was enabled readily to measure all the various specimens, and also to distinguish the imbrications with comparative facility. In one or two instances it was necessary to submit the wool to a cleansing process, to remove the fatty matter from the fibres before the imbrications could be distinctly seen. In fact, in both the specimens of Southdown wool I examined, the imbrications were completely hidden from view by the fatty secretion; the Merino specimen being, on the other hand, singularly free from it. I believe that none of the specimens I obtained had been previously washed. In order to remove this fat I had recourse to ether, which quickly dissolves it, leaving the fibres clean, white, and in splendid condition for observation.

"In order, as far as possible, to secure accuracy, I made fifteen measurements both of the diameter and number of imbrications in each specimen of wool, taking the average as being approximately correct. The scale with which I made the measurements was an ocular micrometer, each division of which corresponded to .00385 millimetres, and there being fifty of these divisions, the whole scale had the value .1925 m.m.; this expanded into inches gives one division equal to $\frac{3}{2000}$ of an inch, and the whole scale equivalent to $\frac{3789}{50000}$. The number of divisions of the scale which the fibre appeared to cover, multiplied by $\frac{3}{2000}$, gave, of course, the diameter of the fibre in the fractions of an inch; the imbrications I calculated, by counting the number found, in the length of the scale, *i.e.*, in $\frac{3789}{50000}$ of an inch, and from that calculating the number to the full inch. Of course, owing to the fibres being so highly magnified, a very slight variation in the number of the imbrications of two of them, as observed by the microscope, would cause an apparently very large difference in the number when calculated out to the inch. This fact is to be borne in mind when examining the appended table, for, as will be seen, there is an apparently very large difference between the diameter of the largest hairs and that of the smallest in any breed. Take, for example, the Southdown: in it the largest fibre measured was $\frac{1}{600}$ of an inch, and the smallest $\frac{1}{1333}$; the diameter of the former is more than twice the size of the latter, and yet they are both so very small that the great difference in size is comparatively trifling. In some instances—as for example, the Shropshire Down Grade—there seem to be two well-marked sizes of hairs, one measuring from $\frac{1}{784}$ to $\frac{1}{833}$ of an inch, and the other from $\frac{1}{606}$ to $\frac{1}{666}$ of an inch. Another point to be noted is, that even in different points on the same hair the measurement differs, as, for example, a hair from a Cotswold measured at one place $\frac{1}{333}$, and at another $\frac{1}{400}$ of an inch.

"In the following Table I have given the diameter in inches of the largest and smallest fibre observed, and also the average diameter; and similarly, the smallest and greatest number of imbrications in the inch, and the average number. To readily allow comparison of the diameters of the wool of the various breeds, I have given a number of circles, drawn to scale, representing the relative size of the individual hairs in the wool of each breed:—

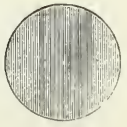
TABLE.

Showing the Average Diameter and Number of Imbrications to the Inch in the Wools of various Breeds of Sheep, as bred and managed at the Ontario Experimental Farm.

No.	Name.	Diamater.	Imbrications.	Relative Size.
1	Merino	$\frac{1}{880}$ – $\frac{1}{1300}$; average, $\frac{1}{1000}$	1846—2638 ; average, 2303	
2	Southdown	$\frac{1}{800}$ – $\frac{1}{1333}$; average, $\frac{1}{1082}$	1847—2111 ; average, 1961	
3	Southdown Grade	$\frac{1}{800}$ – $\frac{1}{1082}$; average, $\frac{1}{920}$	1589—1846 ; average, 1715	
4	Merino Grade	$\frac{1}{800}$ – $\frac{1}{1082}$; average, $\frac{1}{1024}$	1583—1962 ; average, 1860	
5	Leicester	$\frac{1}{555}$ – $\frac{1}{1111}$; average, $\frac{1}{717}$	1055—1589 ; average, 1283	
6	Shropshire Down Grade	$\frac{1}{570}$ – $\frac{1}{850}$; average, $\frac{1}{680}$	1187—1589 ; average, 1372	
7	Shropshire Down	$\frac{1}{555}$ – $\frac{1}{850}$; average, $\frac{1}{680}$	1187—1715 ; average, 1501	

TABLE.

SHOWING the average Diameter and Number of Imbrications to the Inch in the Wools of various Breeds of Sheep, as bred and managed at the Ontario Experimental Farm—(*Continued.*)

No.	NAME.	DIAMETER.	IMBRICATIONS.	Relative Size.
8	Oxford Down Grade.....	$\frac{1}{512} - \frac{1}{883}$; average, $\frac{1}{611}$	1187--1847 ; average, 1511.....	
9	Canadian	$\frac{1}{555} - \frac{1}{741}$; average, $\frac{1}{611}$	1187—1715 ; average, 1425.....	
10	Leicester Grade	$\frac{1}{555} - \frac{1}{741}$; average, $\frac{1}{554}$	1319—1715 ; average, 1513.....	
11	Oxford Down	$\frac{1}{512} - \frac{1}{833}$; average, $\frac{1}{517}$	1187—1715 ; average, 1511.....	
12	Cotswold	$\frac{1}{334} - \frac{1}{667}$; average, $\frac{1}{487}$	791—1319 ; average, 1117.....	

Grade here is the result of the pure bred ram, respectively, with an ordinary Canadian ewe (9), which is therefore the *female* source of all these grades.

"From this table it will be at once seen that the Merino stands preëminently first, both as regards the fineness of the wool and the felting qualities, as indicated by the number of imbrications. Following it, and far ahead of the third in the order of merit, stands the Southdown; and succeeding it come Southdown Grade and Merino Grade, both about equal; for though the former surpasses the latter in fineness, yet the Merino Grade is about as far ahead of the South Down Grade in the number of imbrications. The fineness of the wool is, however, of greater importance than the number of imbrications, and on that account I have placed the Southdown Grade before the Merino Grade.

"The three following varieties—viz., Leicester, Shropshire Down Grade, and Shropshire Down—are about on a par for the same reason, the latter two being imbricated much more finely than the first, and the Shropshire Down very much more finely than either of the other two, in addition to which the imbrications are more distinct, indications which would denote better felting qualities. I have placed the Shropshire Down last of the three only on account of its greater diameter, it being really, as far as the microscopical appearance goes, a better wool.

"The Oxford Down Grade and the Canadian breed are about on a par, as are also the Leceister Grade and the Oxford Down, any advantage being on the side of the former, while the Cotswold, both in diameter and in the number of imbrications, falls far below both.

"I have no more to add, except to point out the unsatisfactory nature of a single examination. To be of any great value, the observations would require to be extended over a number of years, and made in different parts of Canada, in order that the influences of climate, fodder, etc., might be justly appreciated.

"I remain,

"Yours respectfully,

"J. Playfair McMurrich,
"*Professor of Biology and Horticulture,*
"*Ontario Agricultural College.*

"To Prof. Brown,
"*Agricultural College, Guelph.*"

Wool, then, is no simple hair, with little variety, among breeds, but a beautifully scaly-toothed plant, differing in size and form, according to soil, climate and management—management implying food, and mode of treatment. The twelve distinct wools of this farm offer a rare field of enquiry.

As a practical farmer, I want to know which of these wools is best for certain manufactures? Does there exist any reason why the manufacturer should not order from me, and others, the kind of wool he wants, and which he can describe as requiring—

1.—A certain length;

2.—A certain strength, or breaking power;

3.—A certain diameter;

4.—Having so many spirals, or curls, per inch;

5.—So many teeth, or imbrications, per inch?

The regulation of these, to a large extent, is in the hands of the grower, and so long as the manufacturer makes no complaint, so long is the former likely to remain indifferent. How many of my profession know, or care, that, while to the naked eye and easily handled as a subject of rustic examination, the wool of the Merino is nevertheless so fine that it requires one thousand (999) of them, side by side, to cover one inch, and that one inch of its length shows actually 2,300 teeth? If there be value in these things, then what is the difference to the manufacturer when, with the Cotswold, we can give but 487

fibres and 1.117 serrations per inch? Between these extremes in Professor McMurrich's table there lies an interesting study—even still very little understood by the manufacturers themselves.

It will be satisfactory to Leicester men to find their favourite so high in fineness of fibre, beating even the Oxford and Shropshire Downs with their grades; at the same time, this typical sheep is second lowest in serrations, only 1,283 per inch. In our ignorance we ask how it is that some breeds seem to have more power than others in regulating the character of the fleece? Try the following comparative Table for this check :—

View of the Impressive Power of Pure Bred Rams in Regard to Wool.

BREED.	1. Possessing.		2. And Put to.		3. Give.		4. Compare with Mean of Male and Female.		Greater Influence by
	Diameter.	Teeth.	Diameter.	Teeth.	Diameter.	Teeth.	Diameter.	Teeth	
Merino	999	2303	611	1425	725	1860	805	1864	Male.
Southdown	982	1961	"	"	826	1715	796	1693	Male.
Leicester	717	1283	"	"	554	1513	664	1354	Female.
Shropshire Down..	660	1504	"	"	669	1372	635	1464	Equal.
Oxford Down	517	1511	"	"	611	1511	564	1468	Equal.
Mean	777	1712	611	1425	677	1594	693	1568	....

There may not be much in this table, and yet it is a line of enquiry that should not be overlooked. It is the belief of breeders that the male has the greater influence in most things, even to the fleece; this is probably correct so far as regards length and spirals, or otherwise, as can be judged by the naked eye, but may not be as to the minuter construction of the fibre. In order to be able to make an easy comparison with actual results, as shown in column 3, the fourth column is the mean of columns 1 and 2. No doubt the farther the male is removed from the common Canadian ewe, such as the Merino and Southdown, the greater we would expect the sire's influence to be; and the nearer, as in the Leicester, the less that influence; while, on the other hand, the two medium wools, Shropshire and Oxford Downs, would be expected to balance matters. These are the facts exactly, according to this our first scientific wool examination.

IX.—FAT SHEARLING WETHERS.

As usual, the breeding of these with us has been the first cross of the pure bred rams and a common Canadian ewe, with the one exception named; they were dropped, on an average, on the 10th March, 1881, and weighed for this record on 1st June, 1882, say 445 days. First, as to weights :—

LIVE WEIGHT OF FAT SHEARLING WETHERS—(SHORN).

——	AVERAGE WEIGHT OF TOPS.	AVERAGE WEIGHT OF CULLS.	MEAN.	DAILY RATE PER HEAD.
	lbs.	lbs.	lbs.	lbs.
Leicester, *High Graded*	242		242	.54
Leicester Grades	189		189	.40
Oxford Down Grades	186	147	167	.37
Shropshire Down Grades	185	148	167	.37
Southdown Grades	165	133	149	.33
Merino Grades	138		138	.31
Mean	184		175	.39

I should like to say a good deal in regard to the Provincial importance of this subject of weight of shearling mutton, but cannot lengthen much in such a form as this. It is obvious, first of all, that our best men are now settling down to the work of feeding young mutton of sufficient weight to make it pay. It is as true in this as in beef growing, that the sooner we get rid of every head we can spare the better, so long as a *paying weight* is reached. The regulation of weight lies with the consumers, and Britain, as our best market, wants, as is well known, just about 160 pounds alive. That this can be attained with lambs of the previous year is evident from our previous reports, and now again corroborated by these figures. The high graded Leicesters in the Table are the only wethers not of our own breeding, having been got from William Whitelaw, Esq., of Guelph, and fed by us in order to show to what "blood" and kind can be *pressed*. The heaviest of the lot made 272 pounds—a daily average of no less than .60 (nearly two thirds of a pound)—a most unusual result in sheep life. But the ordinary grade of the Leicester is size enough for any wants, and coarse enough to exclude it, along with the Cotswold, from the table of even the middle classes. At the same time it is but fair to admit that, taken when a shearling, Leicester mutton is not nearly so patchy and unpresentable as when older. Next to the Leicester in weight is the Oxford Down Grade, which in our six years' experience has always given over 180 pounds per head, and a daily rate of one-third of a pound. The Shropshire Down Grade has twice surprised us in its early maturing—equalling the Oxford. Its build does not convey this in estimating by the eye, as the comparatively narrow forequarters impress a lightness that does not exist; as with polled cattle, they weigh like lead. Compare with these the grade of the South Down—a record of 149 pounds per head on an average, and 165 by tops. We cannot speak from experience regarding the flesh quality of the Merino Grade; Europe calls it woody and in want of marble, though the United States gives a more favourable report. The weight with us is certainly handsome, according to kind, but it must be noted that the ram is of the French stamp, a pure and recently imported Rambouilia, weighing now 240 pounds.

X.—SOME FACTS TO GUIDE THE GROWER OF BEEF.

Any branch of science that is intimately related to the more prominent necessaries of human life must be the most interesting of all sciences. The beauties of study in Astronomy and Geology cannot, for example, compare in intrinsic value with Animal Physiology and Chemistry as taught through the upbuilding of a fattening steer and of a bushel of

wheat; yet the discoverer of a planet or of a new compound secures the world's applause, as against the producer of improved food for man. That this will always be so is not evident, because, I think, as the world becomes more practical, it will also become more honest in distribution of favours that bear upon the every-day comforts of its people. Excuse the temptation thus given to record in our history, as Experimentalists, how much we rejoice with Europe in the high honour just accorded to the late J. B. Lawes—now Sir J. B. Lawes, Bart., of Rothamstead, England—England's first man in the science and practice of what has largely made her a nation—Agriculture.

It is already a certain thing that the leaders of all classes are becoming more practical in regard to the life of the millions of every country; in fact, land and its productions are not only the absorbing questions, but are at the root of a revolution that will ring the earth in another ten years. In calling the attention of Ontario farmers to this phase of rural economy, I do so with the view of obtaining for that branch of it called "Live Stock" such a measure of scientific recognition as its importance justifies. I do not complain that science has taken no notice of beef, mutton and wool, in other countries, but I do complain that the great national bodies of scientific men on this continent have not formally admitted farmers as co-partners in their annual deliberations. I shall apologize if I am in the wrong in this, as I may have overlooked some recent work; but I cannot withhold complaint, if, on the other hand, no place, for example, has been, or will be, allowed the scientific and practical agriculturist, nor any encouragement given, in the prosecution of his studies, at the forthcoming meetings of the American and British Associations for the Advancement of Science, at Montreal.

The enterprising farmer of these days is not satisfied with a knowledge of the principles of the sciences that are intimately related to his profession—the practical application of some of which he can even venture upon himself—but he requires that the pure scientist guide him through all the daily and yearly history of every field and animal of his farm, in order to the greatest amount of the most valuable produce, in the shortest time, at the least cost.

The Purpose of Cattle Fattening—

1. Is to obtain the largest quantity of the best quality of beef, at the least cost, under three years of age.
2. To aim at breeding, raising, and fattening one cattle beast from every ten cultivated acres of the Province.
3. To grow all the food required for these purposes within ourselves.
4. The animals to weigh alive not less than 1,500 pounds each.
5. The net cost of production, giving credit for manure, not to exceed five cents per pound, live weight.
6. To obtain one ton of manure per month, from each cattle beast over two years old, when stabled to finish the fattening process.
7. The value of such manure, under the best management, to be made worth $2.50 per ton.

The Animal in Cattle Fattening.

In any class it is desirable to have—

8. Purity of sire;
9. A certain age and sex;
10. A quiet disposition;
11. Quality, as indicated by fine head and ears, fine bone, horn, tail, and a medium thick skin, having plenty of fine, soft silky hair, with mellowness;
12. A weight-carrying frame;
13. Such a breed as will mature, or premature, from two to three years of age;
14. Having the character of doing best upon Ontario pastures;
15. Giving the best quality of flesh, with least offal;
16. Sure breeders and good nurses;

17. The Shorthorn Grade is best for weight, early maturity and stall feeding ;
18. The Hereford Grade is best for hardiness, and grazing disposition ;
19. The Aberdeen Poll Grade is best for an even average of all requirements ;
20. The Galloway Grade is best for extreme hardiness and quality of flesh ;
21. The Devon Grade is best for good nursing and sure breeding.

The Food of Fattening Cattle.

Its use is to—

22. Keep up animal heat, or life;
23. Repair the waste ;
24. Increase growth ;
25. Produce flesh and fat.

Its value is affected by—

26. The particular breed ;
27. Age of the animal ;
28. Individual character ;
29. Conditions of life—such as temperature ;
30. Management.

31. In growing our own cattle food, the first question should be :—How much beef can we get per acre ? the second, How much manure are we able to return ?

32. The amount of increase that may be calculated upon as the produce of certain quantities and kinds of food, depends upon paragraphs 8 to 30.

33. Chemically, we can calculate upon getting one pound of flesh from any food that has *ten parts of dry substances* in its composition :—thus, 100 pounds of Swede turnips, having as much as ninety parts of water, will only give the pound of flesh, while 100 pounds of corn, having only thirteen parts of water, will give ten pounds of flesh.

34. Practically, foods give results according to their chemical analysis, when combined, or mixed, to suit the particular animal system.

35. For example, a mixture of corn, peas and oats, will give better results than corn alone, although seven per cent. lower in nutritive properties.

36. Never forget the difference between "life" food and "fattening" food ; starch and sugar keep up heat and life, and unless they are supplied, along with fats and oils, the fattening process will be slower, because heat and life would have to be supplied from the fats and oils ; if given in excess, starch and sugar will produce fat on animals.

37. A young animal, building its bone and muscle, requires different kinds and quantities of food from the more mature one. Hay, straw, and other fodders are best for the immature animal ; they are also heat and fat makers, and would fatten alone, though slowly.

38. Rapid growth and much fat are opposed to each other ; so, to grow carcass and also fatten early, requires bone-forming and fat-forming materials—they must go together.

39. A maturing animal—cattle two to three years old—having built the most of its frame, requires less fodders, and more flesh and fat formers. Grain in many forms is therefore best for finishing fattening cattle.

40. From birth to the time a cattle beast is ripe, the daily rate of increase on an average should be not less than one and one-half pound,—thus, a three-year-old should weigh 1,600 pounds ; and two and one half-year old, 1,360 ; and a two-year-old, 1,100 pounds alive.

41. But, in fact, the daily rate of increase is more up to two years, than at any time afterwards. A two-year-old, well done to, will weigh 1,400, and if carried on to three years, will not scale less than 1,800 pounds. This may be called *pre-maturing*.

42. Very much then of the success of obtaining big weights in a short time, lies in a knowledge of individual character, and the proper proportions and kinds of food.

43. The best kind of permanent pasture—a mixture of certain grasses and clovers—under favourable conditions, will give a greater daily increase than any other form of food.

44. A two-year-old cattle beast put to such pasture on 15th May, when it weighs 1,100 pounds, will stand 1,400 on 1st October following. The addition of grain under such circumstances does not add correspondingly to weight, though it does so on comparatively poor pasture.

45. Proper shelter and water on pasture means forty per cent. of the increase.

46. When no first-class permanent pasture is kept, it is desirable to provide for short commons by having a regular supply of green fodders; feed these either upon the fields or by "soiling."

47. Soiling fattening cattle in Ontario implies the production of one animal per acre, in place of three acres of ordinary pasture maintaining one; the principal soiling crops are corn, lucerne, red clover, tares and oats, rye and rape.

48. When it is desired to prepare for exhibitions, or for extra condition at Christmas, soiling, in a loose box all summer, in addition to grain, cannot be surpassed by any other form of feeding.

49. Straw cut and slightly fermented is one-fourth more valuable for fattening.

50. Green oat-straw and pea-straw together are about equal in value to hay.

51. Thirty-five pounds Swede turnips, six pounds clover hay, and two and one-half pounds oilcake will produce one pound of beef.

52. One ton of fermented cut straw and two hundred pounds oilcake is equal to one ton of hay.

53. Six pounds hay, one pound bran, twenty pounds turnips, and five pounds corn-meal will add one pound to the weight of a good two-year-old steer.

54. Six pounds hay, one pound bran, twenty pounds turnips, and six pounds pea-meal will do the same thing.

55. The like quantities of hay, bran, turnips, and seven and a half-pounds crushed oats will do the same thing.

56. Corn, peas, oats and barley, will pay to fatten cattle when not over one cent per pound in the market.

57. Barley-meal gives a fine finish, and sleek, mellow handling.

58. In soiling, green fodder is safer when cut and mixed with cut straw or hay, allowed to slightly ferment and sprinkled with meal.

59. It is still an unsettled question whether cooked food or raw food is best for cattle fattening.

60. All animals fatten cheaper and faster on prepared raw food, as against whole or uncut hay and roots.

61. Every animal that chews the cud must have *bulk*; it is not enough to give sufficient nutritive value in small quantities,—the stomach must be filled to give material for ruminating.

62. Most foods are better in combination than alone.

63. Combine so as to have little or no waste.

64. Fat-producing and flesh-producing food *together* will give sixty per cent. more increase than when given singly.

65. For young cattle give 1 of flesh to 8 of heat-producing substances, and to older ones give 1 to 6.

66. Most food of young cattle goes to make up bone and muscle, leaving third-class manure.

67. Most food of half-grown animals goes to make flesh, leaving second-class manure.

68. Most food of mature animals goes to make fat and support life, the excess becoming first-class manure.

69. Exclusive of water chemically, animals coming to maturity will eat about one-fiftieth of their own weight per day.

The Management of Fattening Cattle.

70. Most animals eat in proportion to their weight, under average conditions of age, temperature, and fatness.

71. All animals increase in weight in proportion to the quantity and character of the food consumed, if fed exactly according to breed, size, and condition of surroundings.

72. Give fattening cattle as much as they will eat, and often—five times a day.

73. Never give rapid changes of food, but change often.

74. A good guide for a *safe* quantity of grain per day to maturing cattle is one pound to every hundred of their weight; thus an animal weighing 1,000 may receive ten pounds grain.

75. Early stall feeding in the fall will make the winter's progress more certain by thirty per cent.

76. Give as much water and salt at all times as they will take.

77. In using roots, it is one guide to give just as much, in association with other things, so that the animal will not take any water.

78. In buildings, have warmth with complete ventilation, without currents,—never under 40°, nor over 70° Fah.

79. A cold, damp, airy temperature causes animals to consume more food without corresponding results in bone, musle, flesh, or fat; much being used as fuel to keep up warmth.

80. Stall-feeding is better for fat making than box or yard management, irrespective of health.

81. The growing animal, intended for beef, requires a little exercise daily, to promote muscle and strength of constitution; when ripe, only so much as to be able to walk to market.

82. Currying daily is equal to seven per cent. of the increase.

83. The temperature of the body should be about 100°, not under 95°, nor over 105° Fah.

84. Don't forget one animal's meat may be another animal's poison.

85. It takes three days' good feed to make up for one bad one.

86. The faster the fattening the more the profit: less food, earlier returns, and better flesh.

87. Get rid of every fattening cattle beast before it is three years old.

88. Every day an animal is kept, after being prime, there is loss, exclusive of manure.

89. The external evidences of primeness are full rumps, flanks, twist, purse, shoulder vein, and eye.

90. A good cattleman means a difference of one-fourth. He should know the likes and dislikes of every animal.

91. It pays to keep one man in constant attendance on thirty head of fattening cattle.

92. Immediately an animal begins to fret for food, immediately it begins to lose flesh; never check the fattening process.

93. Never begin fattening without a definite plan.

94. A steady, frosty winter is better than an open one for cattle fattening in Ontario.

95. There is no loss in feeding a cattle beast well for the sake of the manure alone.

96. No cattle beast whatever will pay for the *direct increase* to its weight from the consumption of any kind or quantity of food—the manure must be properly valued.

97. On an average it costs, on charging every possible item, twelve cents for every additional pound added to the weight of a two or three-year-old fattening cattle beast.

98. In this country the market value of store cattle can be increased thirty-six per cent. during six months of the fattening finish.

99. In order to secure a sure profit, no *store* cattle beast, of the right stamp and well done to, can be sold at less than four and a half cents per pound, live weight.

100. In the finishing of a two-year-old for beef, during the last six months of winter, its financial history consists of three things of nearly proportionate values:—

(1) Value of animal, previous to entry for finishing 1,200 pounds at five cents	$60 00
(2) Cost (not value) of food for six months	35 00
	95 00

(3) Total value of fattened animal, 1,500 pounds at 7c	$105 00
Cash profit	10 00
(4) Value of manure produced	30 00
Total profit	$40 00

101. During winter, feed thus for finishing :—

First month :

	lbs.
Common turnips	40
Straw, cut	7
Hay, cut	5
Oats, crushed	5

Second and third months :

	lbs.
Swede turnips	40
Hay, cut	7
Straw, cut	3
Corn	8
Bran	2

Fourth and fifth months :

	lbs.
Swedes and mangolds	50
Hay	10
Corn and peas	10
Bran	3

Sixth month :

	lbs.
Mangolds and Swedes	50
Hay	12
Corn, peas, and oats	12
Bran	3
Oilcake	3

XI.—AN EXAMPLE OF THE APPLICATION OF THESE PRINCIPLES.

And now for an example of the application of these one hundred things that serve as a guide to the successful production of beef. This very concisely.

The Purpose.

We put up four yearling high-graded Shorthorn steers on the 21st October, for the purpose of showing at the Provincial and Toronto Exhibitions what, in our opinion, is the proper stamp for exportations to Britian. As this implies the ability to endure fatigue without any going back in condition, we have avoided what may be called over-feeding corresponding with age; when in September first, therefore, at Kingston and Toronto, they will stand as having been liberally, but not extravagantly, brought up from birth. At that time we expect the average weight to be 1,650 pounds when 920 days old. (See succeeding part of this report.)

The Animal.

Standing of Four Steers, 12th June, 1882.

NAMES.	Age in Days.	Weight at Date.	Daily Rate of Growth Previous to Stall Feeding.	Rate of Growth During Past Winter.	Rate of Growth for Whole Age.
Conqueror	881	1466	1.74	1.40	1.66
Chancellor	878	1544	1.69	1.90	1.76
Champion	816	1440	1.84	1.57	1.76
Commander	732	1445	2.00	1.86	1.97
Mean	827	1474	1.82	1.68	1.79

Our four "C's" on 12th June weighed, on an average, 1,474 pounds, and as the mean date of their birth was 7th March, 1880, the daily rate of growth up to entry for stall feeding has been 1.82 pounds; the highest 2.00, and the lowest, 1.69. This is, as usual with young animals well done to, more than the subsequent rate during the winter's stall feeding on a very liberal diet of grain, fodder and cake. Conqueror was sick for a month, and thus shows a very low daily increase of 1.40, and, of course, reducing the average to 1.68; otherwise we would have had, I think, one and three-quarter pounds per head per day. The whole life rate stands well at 1.79.

The Food.

In this record it is but necessary to give what has been used since the change from store to stalling, beginning as already noted, on 21st October last. The average daily ration has been,—

	lbs.
Hay, long	12
Roots, Swede turnips, and mangolds	35
Bran	2
Grain, corn, peas, oats (in equal parts)	10
Cake, during last thirty-four days	4 1/2
Thorley's Food, for two months	1/4

These sixty-three and a half pounds of materials, daily, cost thirty-five cents in the market, and seventeen and a half cents to the producer. As in this case the feeder was the producer, with the exception of the cake, corn, and Thorley's, I am allowed to debit the average cattle beast with the cost of production only. Thus the actual value of food consumed during the 234 days amounts to $40.36, which is equal to ten and one-third cents for every pound of increase to weight during that period.

As I have on previous occasions shown in what way fattening cattle pay for this apparently unprofitable feeding, it is unnecessary to repeat here.

As I write, I am offered $450 for these four steers, for exportation.

XII.—LESSONS GATHERED FROM 1881-82 WORK.

1. The scientific check in the fattening of cattle with three kinds of grain stands thus :—

	Contain.	Nutritive Ratio.	Daily Results.
	Per cent.		lbs.
Corn, 10 lbs. daily :—			
Albuminoids (flesh formers)	1.00	1:8.3	1.91
Crude Fibre	.55		
Carbohydrates (sugar, starch, etc.)	6.21		
Fat	.65		
Peas, 10 lbs. daily :—			
Albuminoids	2.24	1:2.7	1.82
Crude Fibre	.64		
Carbohydrates	5.25		
Fat	.20		
Oats, 10 lbs. daily :—			
Albuminoids	1.20	1:6.0	1.60
Crude Fibre	.93		
Carbohydrates	5.57		
Fat	.60		
Mean		1:5.7	1.78

2. The practical feeder asks: Why have we had most increase from the *least* proportio n of flesh-forming materials, and where also there is the least nutritive ratio—1:8.3—which means 1 of flesh-forming materials to 8 of sugar and starch, etc. ?

3. If the amount of fat, along with sugar and starch in food, gives corresponding results to fattening animals, then the corn has taken its proper place.

4. Is the very high percentage of flesh formers—2·24—in peas, counteracted by the low proportion of fatty materials—.20—so that while the nutritive ratio is so very high as 1:2.7, the result in adding to the weight of a cattle beast is less ?

5. What makes the Oat take a third place in this contest ? Is it the possession of fifty per cent. more crude fibre, for there is nothing else very different ?

6. On an average of the three grains we got a daily increase of $1\frac{3}{4}$ pounds per head by giving 1:5.7—that is, 1 of flesh-forming materials to 5.7 of sugar and starch.

7. Chemically the two cakes stand thus :—

	Linseed.	Cottonseed.
	Per cent.	Per cent.
Albuminoids	28.3	34.3
Crude Fibre	11.0	9.6
Carbohydrates	37.3	27.4
Fat	10.0	10.9

8. The greater proportion of flesh-formers in cottonseed did not maintain animal life so well as where less of it was given, but accompanied with forty per cent. more starch and sugar—37.3 and 27.4. It is pretty evident in this example that heat and life were supported by the sugar and starch of the linseed, and also gave a slight increase to weight, while the cottonseed, having forty per cent. less of these, maintained life, but did not add to weight.

9. The world is yet largely ignorant of the effects of different soils, climates, foods, and modes of management, upon wool of various breeds of sheep, and too little attention is paid to the crop when grading for mutton. The manufacturer should pay only for so many teeth and spirals, *per inch*, with a certain texture and strength, making length a subordinate point, because length can be easily regulated.

10. The average weight of five kinds of grade fat shearling wethers was 162 pounds, or fully one-third of a pound per head per day—the exact weight suitable for exportation.

11. There are several things in cattle-fattening that cannot be found in books, yet principles to guide the profession are important and not difficult to follow. In the example given in the eleventh chapter herewith, it is plain that any ordinary intelligence may make 1,500 pounds live weight at two years and three months old, and realize a greater profit than by holding to three years.

THE FIELD PLOT EXPERIMENTS OF 1882.

These, as usual, have been carried on in field C—the four acres recently referred to—and in order to an inteligent comparison of results with previous years, previous reports and the weather of the present year should be carefully studied.

I.—Fifteen new Winter Wheats.

It should be borne in mind that in all our experimental work nothing is estimated or left to conjecture, but everything weighed, measured, or otherwise accurately noted.

The Fluke.—This was our heaviest and earliest cropper—cut on 26th July, and producing forty-three and one-quarter bushels of clean grain per acre, which weighed sixty-three and a half pounds per bushel, thus also the heaviest per bushel of any. The straw is of good quality, but rather weak, and only one and one-third ton per acre ; grain a very superior sample, uniform in colour and plump.

The Ontario Experimental Farm. No. 3.—This is a bald variety that stood the winter well, ripened on 7th August with a bold head, strong straw and good average grain ; produced forty-three bushels at fifty-five pounds per bushel only, and two and one-eighth tons of straw per acre.

The Ontario Experimental Farm No. 7.—One of our early maturers, 29th of July, of the bearded varieties, with a large head and free of rust in comparison to others. Sample of grain above the average and uniform in colour. One and three-fourths ton of straw, and forty-three bushels of grain that weighed sixty-two and one half pounds.

The Ontario Experimental Farm No. 8.—This is another of our early and bearded sorts, with heavy straw and large berries, wanting plumpness. Grain forty-two bushels, sixty-two pounds, and two and a half tons straw per acre.

The Ontario Experimental Farm No. 16.—In order of greatest produce of grain per acre comes this bald kind, with an average sized head and fair sample of grain, not uniform in colour this year. There is, however, the very satisfactory weight of sixty-three and a half pounds per bushel, two and a half tons straw, and forty-one and two-third bushels of cleaned grain per acre.

The Ontario Experimental Farm No. 11.—It is some satisfaction to find several of the winter wheats of our own choosing in 1876 taking a lead in quantities if not in quality. This is a variety with a large full head and good bright straw, but slightly touched with rust—maturing on 3rd August. The grain wants in plumpness, but is uniform in colour. Produce—grain, forty-one and one-third bushels, fifty-eight and a half pounds, and nearly two tons straw per acre.

The Fultz (bald).—This well-known wheat matured on 26th July, which saved it entirely from rust. It is a good stooler, sending up every stalk well, and ripening evenly. Grain uniform in every respect, weighing sixty-three pounds per bushel, and produced exactly forty-one bushels per acre, upon one and three-quarters ton straw.

The Washington Clawson (bald).—Having an even heavy straw, bright and free of rust, with large head, large berry, uniform in colour, and plump. The produce in grain was thirty-nine and two-third bushels, in straw one and one-seventh tons, and the grain weighed sixty and a half pounds per bushel.

The Ontario Experimental Farm No. 9.—Was somewhat winter killed, yet gave an even crop ; average sized bearded head, with medium berry of a fair sample, produce 39½ bushels weighing sixty-two and a half pounds, with one and a half tons straw per acre.

The Diehl Fyfe is perhaps an old friend under a new name, bald, good straw, somewhat small in head, a fine sample of grain, very uniform and plump. Per acre, thirty-eight and three-quarter bushels, weighing sixty-one pounds, with fully one and a half ton straw.

The Finlay (bald).—Another of our hardier kinds, with long clean straw standing well up and unaffected with rust. The head is on the small side, but gives a superior plump sample of grain that weighed sixty-two and a half pounds per bushel, two tons straw, and thirty-eight and a half bushels per acre.

The Turkey (bearded).—Head of an average size with medium plump grain of uniform colour ; straw gave two and three-quarter tons per acre ; grain thirty-seven and two third bushels per acre, weighing only fifty-eight and a half pounds.

The Blue Stem.—A bald, large headed sort with somewhat weak straw, and plump grain of irregular colour, weighing sixty and a half pounds per bushel ; produce thirty-five bushels exactly per acre.

The Excelsior gave a very even crop of plants with grain of uniform colour, but not high in plumpness, that weighs fifty-nine and a half pounds per bushel, from thirty-four and one-third bushels, and one and one-quarter ton straw per acre.

The Clawson Club.—An even crop on the lightish stamp in straw, with a good he grain shrunken, and weighed only fifty-six pounds per bushel. Produce per acre thirty-three and one third bushels.

The Rust Proof (bald).—This maintained its name this year for clean bright straw ; head short, with a superior and plump berry ; straw two tons fully ; grain, thirty-three and one-fifth bushels per acre, and sixty-one pounds per bushel.

The Tappahanock (bald).—Head of average size and a medium plant in other respects, with an uniformly fair sample of grain-plump ; nearly three tons of straw per acre ; grain, thirty and a half bushels per acre, weighing fifty-nine and a half pounds.

I give these fifteen varieties because of their comparative rareness and being above the average in produce per acre. The average produce has been forty bushels per acre, weighing sixty and a half pounds per bushel. All evidence of a propitious season if nothing else.

II.—Some Oats in Opposition.

In this we desire to present, from among others, those that are comparatively new—at least by name, and to note the very great difference in produce from some of the old sorts. All were treated alike, and conditions otherwise in every respect alike.

Black Tartarian (from Scotland)	58	bushels	per	acre.
Norway	43	"	"	"
Black Brown	41	"	"	"
Fort William	38	"	"	"
Arabian	38	"	"	"
Washington	34	"	"	"
White Flanders	31	"	"	"
Black Hungarian	19	"	"	"
Hulless	15	"	"	"
Edmonton	10	"	"	"

III.—Barley in Opposition.

Here, also the case is one simply to ascertain the produce of kinds under precisely similar conditions.

Spring barley	39⅔	bushels	per	acre.
Potter's Prize	37⅔	"	"	"
Russian	37	"	"	"
Probestier	31	"	"	"
Washington, six-rowed	35⅔	"	"	"
Carter's Chévalier	30½	"	"	"
Hallet's Pedigree	29	"	"	"
Thanet	26	"	"	"
Hulless	25	"	"	"

4.—Seventeen Forms of Manure and Grain.

This is the fourth crop of grain since the application of the several manures in 1879 and as it is desirable to present the facts of these experiments in a very concise form this year, I beg to refer to previous reports for all the connections, and to the abstract produce of the previous years as follows:—

FERTILIZERS.	1879. Wheat.	1880. Wheat.	1881. Wheat.	1882. Oats.	Average produce per an'm.
	Bushels.				Bushels.
Farm-yard manure and nitrate of soda	23	8¼	41	73¾	49
" " "	23	7¼	40	69	35
" " bone dust	22½	6¼	35	60	31
" " gypsum	21¼	7½	32¼	45	26½
Lime compost	20½	8½	38¼	77½	48¼
Farm-yard manure and gypsum	20½	7	28½	60	29
" " salt	20	5¾	28½	46¾	25¼
" " "	20	6¾	35⅞	48½	27½
" " minera superphosphate	19½	5	30½	62⅓	29¼
" " bone dust	19½	4	31⅓	61¾	29
Salt	17½	4¾	28	33	21
Gypsum	17½	6¼	28	60	28
Nitrate of soda	16	5¾	31½	56½	27½
Bone dust	16	5¼	26	26½	18½
Farm-yard manure and M.'s superphosphate	14½	7	31	58¼	28
Mineral superphosphate	14	3½	29½	45½	23
Farm-yard manure	13⅓	8¼	30½	55½	27
No manure	13⅓	8¼	31⅞	50¼	27
Average from manures					30⅛
Average unmanured					27

In closing this experiment, as now necessitated by change of plots, a few observations may be made. The four years cropping after manure must, to a considerable extent, be taken as evidence of the influence of any manure to produce crops, and the mean of these years should form a good general average; the last column of the table gives this. Soil that has for four years in succession produced an average of twenty-seven bushels grain without manure cannot be called impoverished,—and I must refer to my first report on this subject for evidence that the land was neither rich nor poor by management previous to 1879. Now, where do we have in these seventeen results any clear and unmistakable facts to guide the farmer, or even the experimentalist?

In all the manure accounts there are but three marked cases of produce superior to that unmanured; these are farm-yard manure mixed with nitrate of soda, lime compost, and farm-yard manure and bone-dust. The average of all the produce from the seventeen manures is not more than three bushels over that unmanured. This, to my thinking is further evidence of a character of climate in Ontario, which, with proper cultivation and rotation of crops, demands much less help from fertilizers than the same soil would under a less propitious climate and other conditions.

5.—Room, Air, and Light *versus* Fertilizers.

Two years ago we set aside one plot of one-fourth of an acre to test two special fertilizers, called Marcon's superphosphate and animalized carbon. For this purpose the plot was subdivided thus :—

1.—Without manure.
2.—Marcon's superphosphate.
3.—Animalized carbon.
4.—Without manure.

The crop of 1882 was Australian oats, and produced from

No. 1	62	bushels.
" 2	33¾	"
" 3	53	"
" 4	55¼	"

The average of the two unmanure plots is 58½, and of those that received manure, 43½ bushels. This difference of fifteen bushels per acre in favour of the unmanured cannot be accounted for unless by stronger, more vigorous, better tillering, larger heads, and therefore more grain by the plants receiving more light, air, and room. The three open sides and ends of plots 1 and 4 had unquestionably an immense advantage over 2 and 3, which were enclosed everywhere but the two narrow ends. There is an important lesson in this to everybody, and particularly to the experimentalist. whose results, unless thus checked, may be very misleading. On this subject, see my report herewith on the new experimental field.

6.—Bone Dust, telling from 1878.

Five years in some soils and climates, will, by continuous cropping of grain, tell severely on the permanency of most manures. Naturally we would expect those that are

less easily washed away, less assimilative, or more permanent in their character, to be in a position to aid crops the longer the time after application. The case here is not difficult to understand :—

	OATS.
4.—Bone dust.	.....56½ bushels.
3.—Gypsum.	.....41 "
2.—Nitrate of soda.	.....49½ "
1.—Mineral superphosphate.	....43½ "

7.—Lucerne *versus* Farm-yard Manure.

In this experiment, which was particularly noticed last year, it is only necessary now to observe the continued power held by the clover. The crop of 1882 was Australian oats, and a somewhat inaccurate division of the crop, caused by overlying, gave this :—

Lucerne	70½ bushels per acre.
Farm-yard manure.....	45¼ " "

This looks so important that it must be continued in our new field plots.

8.—Permanent Pasture and Sheep.

This is a continuation of the experiment to test the ability of a mixture of grasses and clovers to maintain so many sheep per acre per annum. The land was seeded in 1878, and previous reports will show what conduct has been every year since. I need not record all the conditions of season 1882, but that grazing was begun on 18th May, and closed on 27th September, with intervals as required by size of plot, and growth during the season. Summing up, we have the fact that one acre of properly seeded and properly managed permanent pasture, during the fourth year of its establishment, maintained nine and nine-tenth's sheep, or about ten large sheep. Grain was given during grazing for which an allowance of fully one-fourth should be made—thus reducing the number to seven per acre. This, in another form, means one and one-half cattle beast per acre.

9.—Some new Swede Turnips in Opposition.

Sowed on 20th June, under ordinary management, and harvested quantities as follows :—

	Bushels per acre.
Marquis of Lorne.....	741
King of Swedes	663
Carter's Imperial.....	652
Bronze Top	639
White Swede	592
Shamrock	534
Providence	491

10.—Mangolds and Sugar Beet.

We submitted a very large variety of these to a thorough test under similar conditions. Sowed on 6th May, and harvested as follows :—

KINDS.	Number of bulbs per acre.	Average weight per bulb.	Bushels per acre.
Mangolds.		lbs.	
Lane's Improved	15746	2.09	753
Mammoth Long	9174	4.89	748
Carter's Warden	8024	4.54	602
Red Globe	12649	2.08	574
Average	11393	3.40	670
Sugar Beet.			
White-grey Top	13066	4.73	1079
White-green Top—Brabant	11676	5.55	1031
Electorale	13066	4.52	984
White-green Top	13900	3.08	892
Early Rose	11398	4.56	866
White-red Top	13066	3.08	839
French White	12649	3.74	790
White Sugar beet	12726	3.21	698
Imperial beet	13761	3.04	697
White Vilmorins	10286	3.05	607
White Small-rooted	14734	2.36	580
French Yellow	8479	3.34	473
Average	12400	3.80	794

11.—Varieties of Potatoes.

Similarly with potatoes, as others, we are continuing the test of their productive powers ; planted 29th May :—

	Bushels per acre.
St. Lawrence	286
Dempsey	247
Late Rose	223
Early Ohio	204
Eureka	201
Brownell's Superior	161
Snowflake	155
Peerless	150
Beauty of Hebron	131
Peach Blow	111
Mean	187

V.—Horticulture and Arboriculture.

For several years past I have asked to be relieved of what has been for all practical purposes, but nominal—the superintendence of the Horticultural Department. During your visit in October last you kindly left this subject entirely in my own hands, and accordingly, I did not hesitate in saying good-bye to what I have been of little advantage, though a well-wisher. In the hands of Mr. Forsyth and the Committee of the Ontario Fruit-Growers Association you may look for increased vigour and well-doing. I have no doubt they will report to you this year in regard to the alterations on the pleasure grounds, the new orchard, vinery, and arboretum, the progress of the field tree clumps and tree seed beds. As I do profess, by right of British servitude and certificate, an intimate acquaintance with Arboriculture, I shall use the privilege of saying something upon such an important branch of our rural economy as circumstances may demand.

VI.—The Mechanical Department.

The value of this department to the farm, garden, College, and students, is most gratifying. I have often spoken to you regarding Mr. McIntosh's worth as a conscientious and able instructor, always commanding the respect and confidence of everyone. His report to me follows, and the recommendation for assistance has my approval as you know.

Mechanical Department.

Wm. Brown, Esq.—

Sir,—I beg to submit the following statement from the Mechanical Department for the past year:—While nothing of a very special nature in new buildings has been required, as was the case a year ago, yet there has been a constant demand for wants to be supplied or repairs to be made from all the other departments.

The first weeks of the term were taken up with completing the new buildings recently erected, which, with other repairs, occupied a good part of the winter months. Another matter which had to be attended to when the cold weather set in, and which has now assumed considerable proportions was the repairing and putting up of the winter windows in the College. The repairing of furniture such as bedsteads, chairs, desks, doors, locks, etc., has likewise come to be no inconsiderable item of labour. These repairs employ the time of one student and very often one or more assistants. A number of the students were employed in making field gates, wheelbarrows, feeding troughs, waggon-boxes, hay-racks, stone-boats, whiffletrees, fork and rake handles, etc. For the garden there were several hot-bed frames and sashes made, and a number of snow shovels. The farm implements were examined and all put in working order, which brought us to the Easter holidays.

After the spring vacation work was resumed, all the field fences and gates were examined and repaired where needed, a number of tree guards were erected, and a quantity of our portable fence hurdles made and set up where required. About this time you showed me a plan of what is called the Oakville portable fence. We accordingly made some of that by way of experiment, and although we found it more expensive than the one we have used for several years, yet it certainly deserves a first place as a good, substantial movable fence, and although we have not yet adapted it as a continuous field fence we found that it would suit admirably for small pens. We have now on hand about fifty pens which were in use at the late annual sale, and which can be speedily placed or removed.

About the 10th of August we began to prepare for the sale by having a number of shipping boxes on hand for shipping sheep and pigs. This somewhat formidable job has been made comparatively easy by the introduction of machinery into the shop for preparing materials. In this connection I would again remind you of the machines we still need, viz., a turning lathe and a surface planing machine.

We have not done any great amount of field fencing this season, although there is yet a good deal required for dividing fields and along a portion of the boundary. After

the seeding down of the fall wheat in field No. 16 we found it necessary to erect about forty rods of a post and board fence on the north side as a protection against stray cattle, and also a small portion of the Dundas Road enclosing what was known as Mr. Halliday's acre.

I would mention the difficulty I have in imparting instruction properly to the students. So much of my own time is taken up with some special job upon which all who are in the department cannot be employed that a number of them must be left to do the best they can for a time without my superintendence, and I can often see upon examining the work afterwards where a little help, which I had not the time to give, would have prevented mistakes. I now repeat that there should be an assistant in the department, in which case the instruction would be more thorough than I have been able to make it as yet.

I am, Sir,

Your obedient servant,

JAMES McINTOSH.

Mechanical Foreman.

VII.—MISCELLANEOUS.

FARM BUILDINGS OF THE FUTURE.

After all that has been said, illustrated, acted upon, and written about farm buildthere is but one way of putting them together, only one method of arrangement, and there cannot possibly be any other. I do not care what the kind of farming is—whether grazing, dairy, or mixed, or in what part of the world it is followed—there is but one principle to guide all.

Take a case, applicable to us as Canadians, so that our explanations may be more easily understood. The first idea is :

Centralization.—There is more expense, more labour, more waste, and greater risks in isolated buildings than in having them together. The risk of less damage by fire when fire does occur, with separate buildings is true, but the contingency is too remote, or at least should be made so, and cannot outweigh the others named.

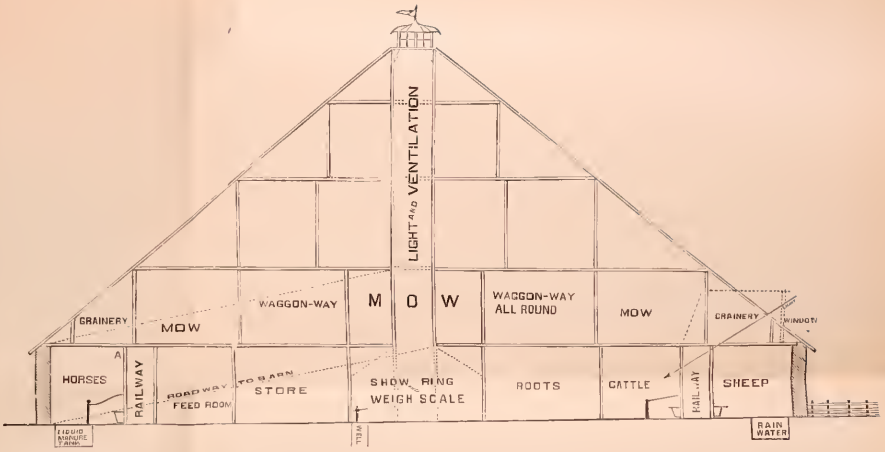
One Covering.—Following in strict agreement with centralization, we must have one covering for everything—nothing whatever excepted—not even the manure ; indeed, the manure in preference to some other things needs it more. Everything under one cover adds to comfort and economizes labour, lessens weather influences—cooler in summer, and warmer in winter, and ensures a profitable collection and distribution of rain-water.

Storing of Food.—The true principle of storing is to store, not to scatter ; in this there is true economy of labour, economy of buildings, less waste, and particularly the being able to arrange the various animals *around that food according to their requirements.* Who would place a sheep nearer the store than an ox, so as to secure what we have indicated ? As the fattening steer needs more weight and variety of food than any other of our domesticated animals, why place him away from the roots, grain, fodder, bedding, and manure pile ?

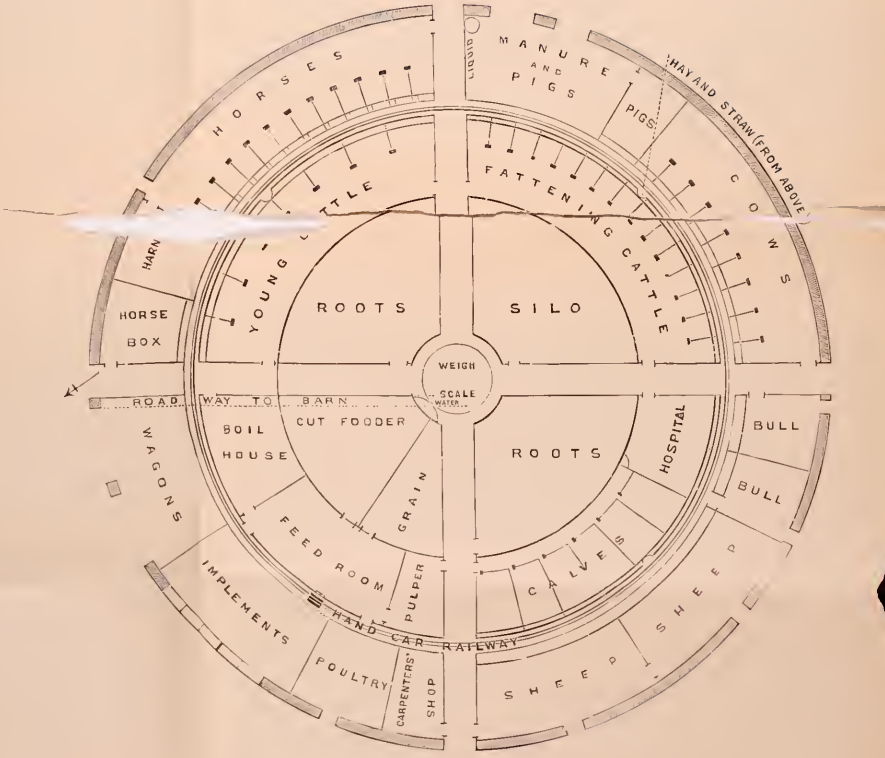
Food Classification of Animals.—Those eating most, such as fattening cattle and store cattle, and so making most manure, to be nearest the food, and nearest the manure pile, so as to save labour, and those requiring most light and most air such as sheep, cows, and horses to be away from the centre, and thus getting more light and air ; so also

Working Classification of Animals.—To be nearest the work, nearest the implements, and most "handy" for men, horses especially should be, so to speak, outside.

Health Arrangement.—Ventilation and light in individual sections, by overhead and windows, ventilation and light by two great roads crossing in centre ; an hospital for sick animals neither warm nor cold, nor with too much nor too little light, and drainage from all parts centering in tank in neighbourhood of manure.



GENERAL SECTION OF CIRCULAR COVERED FARM BUILDINGS.



FARM BUILDINGS OF THE FUTURE: PLAN ILLUSTRATING PRINCIPLES IN ARRANGEMENT, AS TAUGHT AT THE ONTARIO EXPERIMENTAL FARM.

Preparation of Food.—Centralized as it is, with all the *green* fodder on a level with animals and all the dry fooder—hay and straw—in the barn overhead, its preparation for consumption is the next consideration. It matters not whether the food is machine prepared or not, the principle in the arrangement is not affected. Assume, however, for the sake of meeting most difficulties, that machinery is used. Steam or horse power will be necessary overhead, under cover, to drive straw cutter above, grain crusher below, and root pulper below. The lower machinery should adjoin one of the main passages for the sake of room, light, access with materials, and near to the green fodder; the cut dry fodder drops from above into an apartment beside the feed or mixing room. In the *feed room* materials are prepared for distribution in whatever form is considered best, and, in order to assist in this, as well as to be used for other purposes, the boil-house should be close at hand.

Distribution of Food.—Now comes the beauty of centralizing everything. With the feed-room now as our sub-centre, it is required to serve every animal rapidly, easily, without personal danger, and without leaving any food anywhere but in the proper place. In explaining the distribution consider that the whole mass of buildings consists of *three* sections: (1) The outside section containing some of the animals and all the dead materials; (2) the middle section containing the remainder of the animals and all the *prepared* food; and, (3) the inner section, which alone is the *store.* Between the first and second sections there is a passage having on either side *food access to every animal in the building.* Rails and a hand-car or two, if required, in this passage completes the arrangement for distributing food, with the addition of two or three shoots from above to obtain hay and straw.

Cleaning.—The animals requiring daily removal of manure, that from tied-up animals—not sheep, calves, or bulls necessarily, or at least proportionably less—are arranged in strict accordance with economy of labour, and may be done by rail, by hand, or by barrow—throwing the manure over the low fence that separates the pit from the railway.

Water and Weighing.—These should be central, and on the line of the great roads of the building, where waggon-loads, animals, or anything else may be weighed, and all live stock drink under cover. There should also be a weighscale on the track opposite the feed-room, in order to check quantity given per head when necessary.

Outside Courts.—Any number, and arrangement of these are simple, and would be required for poultry, sheep, and bulls.

Aspect.—The way in which the building faces east, west, north, or south is important. Horses having to go to work early and return late, sunshine is not so material to their range as other animals that are housed all day, so, therefore, the implements and horses should have the northern aspect.

Access to Barn.—The large diameter of the building admits of an easy slope on one half of it, so that this access is under cover, and practically there need be no barn door of the present-day-style, and no opening except for ventilation. The slope of this roadway to barn will not interfere with any of the ground plan, and lands above to suit division of mows.

Plan.—The principles thus laid down are illustrated on the accompanying plans. I invite the most severe criticism upon their details. The circular form is best adapted for such an illustration, but an octagon, an ellipse, or even a square would answer, though not so conveniently. There is no reason whatever why a circular building should not serve in actual practice; the expense, I think, would be more.

Description of Circular Farm Buildings.

The principles of construction and arrangement have already been explained, and though the plan and section are plain enough it may be necessary to add some explanations.

The size can, of course, be more or less, according to requirements; in this example the diameter is 150 feet. The building is a complete circle, cut on the ground floor into quadrants by two cross-roads wide and high enough for a waggon load, and occupied at their intersection by a weighscale of the usual kind—say three tons maximum. Across the diameter in any direction the ground floor is divided into nine parts—that is a centre

with four on each side. Entering at any of the four main doors, the first section is laid off for the lighter class of animals, such as sheep, pigs, poultry, cows, and those required for labour, as horses. As a matter of convenience, the implements, manure and bulls are also in this section. Immediately adjoining this outer rim is the hand-car railway—completely round the building, having no break whatever, and forming the second section. The third section is occupied by cattle of all kinds, except cows, one quadrant being devoted to fattening stock, and the other to young cattle; another to calves, and the hospital; and the fourth to food preparing arrangements, such as boil house, feed-room, from which all prepared food is distributed by the hand-car. It will now be observed that every animal in the building can be supplied with food, *at head*, by this circular railway; that hay and straw from shoots above connect with the same, and can be taken to all parts right and left. A large part of the manure can also be taken to yard by car, in addition to water and any form of material. The fourth section is the root and feed stores, with water from a well for general use—easily approached from all quarters. Light, if required at any particular point, may be secured easily, as shown in section; ventilation is abundant with all the roads, and may be added to by over-head traps to any of the sections, as example at A on section of horse stable. The liquid from manure and all the stables is collected in tanks, so as to be entirely withdrawn or re-distributed over the pile. Rainwater from the roof also is stored underground, to be utilized for any purpose. The entrance to the barn slopes from the ground level of outside wall to the centre—being an easy ascent of one in five. The conduction of light from the window dome is a special feature—that, in a smaller building, may not be necessary, but here of importance, especially as it is of some practical value to form the intersection of the cross-roads where the weighscale stands into a show ring, where, for example, a purchaser can examine any animal on a wet day. This show ring could be extended to thirty-five feet in diameter.

On landing in the barn from the sloping roadway, the horses and waggon can be driven all round between the mows—there being a centre and one side mow, that can be made into many divisions. Two granaries take up part of the outside mows, and the space above all, right up to the roof, is ample for large quantities of hay and straw; indeed, the waggon-way itself could, in a press, be utilized for storage.

SCIENCE IN THE ADAPTATION OF SHEEP TO THE PHYSICAL CONDITIONS OF A NEW COUNTRY.

Advanced as we think ourselves in agricultural knowledge in these days, there are some departments of it as much undeveloped as are the natural resources of this magnificent continent. Science, as it stands, through chemistry and some other fields of enquiry, is now the inseparable hand-maid of tillage in all its relations, but I know of little or no co-partnership existing as a systematically applied science with facts in the adaptation of the live stock of the farm to the physical conditions of a new country. All animal life, we know, is influenced more or less by a variety of physical agencies; but sheep having the greater range of any other class, I shall confine myself to the elucidation of this subject by their agency; because, also, no domesticated animal is so dependent in all its requirements upon these conditions—changing its form, rate of growth, weight and quality of wool, and quantity and quality of flesh by the favourable or careless arrangement or selection by man.

There is probably no part of the world without a native breed of sheep, or a variety giving hair or wool closely allied to sheep proper.

Australia may be an exception to this rule, but no other land of much extent. Thus, then, every possible physical condition has its adapted wool and mutton. We have no case in the past of success in establishing the breed of one country in another by leaving the animals to shift for themselves, as they had done on their own natural runs. Naturalization, then, is not a case of leaving things to nature, but the selection of a breed from one country to another so as to obtain equal, and, if possible, superior results by the

adaptation of all the conditions known in its previous history, or by careful and gradual change of old habits to meet any new conditions. This does not imply so much time and expense as may appear to those unacquainted with the plastic character of sheep in the hands of him who is scientifically and practically skilful as a breeder of them.

All improvements invariably radiate from a centre, but they do not flow equally in all directions. In tillage proper, the soil, altitude, geographical position, rain-fall and temperature, together with man's prejudices, tend, individually, and in combination, to turn aside or altogether dam up the regular flow. The distribution of sheep has also been regulated by these influences, and thus we find in older civilized countries distinct breeds of sheep in immediate association with the physical conditions best suited to their profitable development.

On the physical map of the world, the wonderful islands called Great Britain, are but a small green spot of some 77,000,000 acres; to the flock-master, two-thirds of this—while nothing more than a few extensive runs in America—are fields of gold in wool and mutton, and, to the man of science, they possess a variety of interesting and instructive physical characteristics which probably do not exist within a similar extent in any other part of the world. There, therefore, the land is clearly mapped out by certain prevailing classes of sheep. It does not require a profound naturalist to pronounce, for example, the Southdown and Leicester of England as decidedly the result of climate, pasturage and culture.

Here I wish to make several assertions that to some may seem overdrawn, if not largely untrue. There is no other country in the world that is capable of either establishing or maintaining so perfectly different breeds of cattle and sheep as Britain. All the wealth, intelligence, and enterprise that have been displayed in the upbuilding and maintenance of her herds and flocks have not been more than, if equal to, the same things in other countries. There is no prominent breed of cattle or sheep, according to modern standards, the history of which is not practically on this side of 1780, and this is not much more than much of the same thing in the United States of America. Why is it that none of the cattle and sheep of Britain can be maintained in all their original virtue in any other land, or why is it absolutely necessary to obtain systematic importation of new blood from Britain in order to uphold this virtue? Wealth overflows, intelligence on the average is superior, and enterprise and experience are great fields, yet Englishmen in a foreign land cannot do what Englishmen at home have done and can do. It is simply because physical conditions are unpropitious for such maintenance. I know of no examples on this continent where a herd or flock is not indebted to an infusion of new blood during the last decade. It is not a thing of choice, of fancy, or of fashion on the part of the American and Canadian breeders; it is a pure matter of necessity in order to uphold *character*. Not even so, but I hold it is a simple impossibility in the present physical condition of this immense land to *make* a breed of cattle or sheep that will be equal in all essentials to what Bakewell, Collings, Bates, Booth, Ellman and others have handed down to us. I cannot allow any one to point to the Merino sheep as evidence of permanent adaptability here or elsewhere, because they are not what we want in these times of high pressure and no waste. Wool value is but one thing, and one thing is not enough. I have no desire to under-rate the capabilities of the American continent; it is not foreign to my subject, and at this stage of it, to say that as there is no land with so many physical varieties so there is none where health of live stock can be so easily regulated, and where so little troubles in order to require regulation. Practically, sheep diseases are comparatively unknown, particularly north of 40° and west of 90°—a circumstance following naturally the special physical conditions. It is a humbling reflection upon man's work in this regard that his science and practice in the adaptation of the best animal and plant life to the physical conditions of either an old or a new country are sure to be accompanied with what are called "drawbacks"—what are, of course, the natural concomitants of propitious conditions of one life for those of other lives. I know of nothing to mar the almost unlimited first-class production of beef, mutton and wool in the western hemisphere, but I do see some things in the way of maintaining *blood and character*. Thus, then, my subject opens up a great field of enquiry. Irrespective of artificial food and man's modification of the laws of nature, the adaptibility of certain grounds and their associations to a particular development of carcass and wool, are of

course the great starting point in sheep husbandry. The nature of the soil, drainage, rain-fall, vegetation, altitude and temperature regulate the breeds.

It is no matter of contention, therefore, that in order to secure the best possible results in the production of wool and mutton on the American continent, it is absolutely necessary to place the respective breeds among physical conditions as alike as possible, to those that had the making of them. Exact agreement is likely impossible, but under the immense range of *altitude soils, temperature, rain-falls and vegetation* that we possess, no other section of the world could do more than we can as there is every possible combination of these on both sides of the equator. A physical map of the United States and Canada, showing every feature of the country as applicable to our subject, would be of great national value, and which, being coloured according to the known habits of the leading breeds of sheep, would guide the outside flock-master as well as the resident.

As an illustration of this phase of rural economy, I submit what I was asked to do for the British Isles in 1870 ("Brown's British Sheep Farming"). As a general rule the granitic rocks claim the alpine pastures, the limestone and its associates the uplands, and the sandstone the lowlands. If we take these as representatives, and make allowances for geographical peculiarities of districts, we have set down pretty distinct bases for the sheep grounds of Britain. Each of these is distinguished by striking physical characteristics besides that of soils. Their very outlines, for example, at once indicate each, and of course their main features as to temperature, rain-fall and herbage—all being more or less regulated by altitude.

While convinced of the general adaptibility of Britain for sheep stock in its natural state, we are aware that much, both of the suitability of the sheep's constitution, and even the applicability of the several grazings to them, have been brought about by improvements. There has been an agreement of three points in this state of things—the natural disposition of sheep previous to man's modern breeding of them, and his keeping this up to the time in conformity with the altered circumstances of the country and cultivation, and the various zones, have all blended to make the present stock of Britain.

Now I have said that these physical conditions are the great starting point in sheep farming, and thus it is not too much to say that management depends entirely on *breed and the character of the ground*, yet it is too much to affirm that any examination of a new country, however minute, will enable anyone to decide as to the number and class of sheep which any particular run will best maintain. The party long in possession of a sheep ranch knows by an accumulation of circumstances—ordinarily called experience—so far how to economise the various conditions of his subject. In the majority of cases, he has acquired the knowledge by practical facts brought home to him—things which he could not overlook, because they appealed directly to his purse—for and against. These are just other names for scientific deductions which the purely practical man has had to purchase by a long experience. The best judge of sheep and their belongings may not be the most successful graizer; the purely practical man cannot be so well prepared for emergencies, and able to take such an impartial and safe view of matters as he who combines with practical knowledge a judicious use of the deductions of science.

In arranging, therefore, for the growing of wool and mutton on a large scale on the American continent, it is obvious we have only to consider the two things—breeds and physical conditions—the market of course being a point of no doubt.

The accompanying diagram represents, in section, the mean of all the characters of sheep grazings in the United States and Canada from the sea up to an elevation of 6,000 feet. I am aware that some good pastures, such as in Wyoming, exist at over 6,000 feet, but being exceptional are excluded, just as we always exclude the low marshy lands in such a calculation.

In the choice of locality then we are first of all guided by geographical positions as indicated by latitude and longitue, because these materially affect temperature, rain-fall and vegetation. Indeed, there are parts such as California, British Columbia and Nova Scotia, where, inside of a range of fifty miles from seaboard, we have a complete copy of these physical conditions, yet in other cases one thousand miles do not limit the range of the diagram.

BREEDS OF SHEEP,

REPRESENTING

VARIOUS PHYSICAL CONDITIONS OF THE AMERICAN CONTINENT.

Altitude.
Temperature.
Vegetation.
Rainfall.
Soil.
Geographical Position

Altitude regulates temperature, rainfall and pasture, and pasture is also of course affected by the nature of the soil, which in turn varies according to geological formations either near or at a higher elevation. Over this great range of physical conditions there are annually millions of dollars in wool and mutton still untouched, and suitable for all the types of sheep of acknowledged merit.

Lovers of Leicester and Lincoln will find everything to suit the well-known habits of the heaviest sheep of the world upon low rich lands between the sea and five hundred feet inland, where much food can always be had within small space and easy conditions; even much moisture is not objectionable so long as the bed is dry.

A step up will not greatly alter conditions except as regards some change of grasses and soil with a swelling surface. Here the heavy but active and hardy Cotswold and Oxford Down will find a home in every essential, and where a trespass either above or below would do no harm. One thousand feet above sea level on a large continent appears as a flat in comparison with the same thing on an island such as Britain, but such are the marked effects of altitude and less shelter with change of vegetation that Leicester and Lincoln could not possibly give the same profits on these uplands as upon the lowlands.

The sheep division of most countries is invariably one wealthy in varieties of grasses and other plants relished by sheep—valley, river-bed, slope, and broken hill side, offering every possible sort of soil and aspect. I have in remembrance a very marked example of this in Perthshire, Scotland, where in valuing a grazing, that held 6,000 head, I had to take into consideration the superior condition of about one mile of a valley slope that was regularly top-dressed in heavy rains, with washings from broken rock above, that was largely charged with *plumbago*. Here an early rich bite was always sure for ewes and lambs. Limestone, horn-blende and other minerals have also their distinctive vegetation. The medium sized, active and hardy Shropshire and Hampshire Downs should do well in this division. Another step up takes us to the Merino, and another to the Southdown and Cheviot breeds. I have been in some doubts about placing the Merino as high as 5,000 feet, but knowing that theirs is a case of wool more than mutton value, and that a steady temperature with moderate keep are best for production of pile and texture in their own country, the same should apply here.

I have no hesitation in offering the most severe physical conditions to the prominent flesh quality producer of England. The grandly constituted Southdown is admirably suited for short sweet pasture, where moderate weight and highest value of mutton with moderate weight and second highest value of wool, in all our list would bring down gold from mountain tops and probably return as much per acre as those upon the sea shore.

Acknowledgments.

We have pleasure in acknowledging the receipt of the following donations, each of which will be experimented with as directed :—

Two barrels carbonized saw-dust, as a fertilizer, from Messrs. H. B. Rathbun & Co., Deseronto, Ontario.

Two bags carbonate of lime flour—one from Lockport lime rock, the other from Shelby lime rock—as sent by Messrs. Lomber, Wright, & Stoag, of Union Mills, Medina, to fertilize.

Half ton rice meal, from Messrs. Ross, Hall, & Co., Mount Royal Mills, Montreal, to test against other grains in fattening cattle.

Essex boar, from James Anderson, of Puslinch.

West Highland bull, from Geo. Whitfield, of Rougemont, Quebec.

Jersey grade heifer-calf, twin with a bull—supposed to be a "Free Martin"—from W. F. Beadle, of St. Catharines.

Samples of plants and soils, from John Turner, ex-student, late of Hamilton—now of Edmonton, Manitoba—for museum.

And it is my duty, and a particular pleasure, to acknowledge the constant, energetic, faithful, and efficient services of the following gentlemen :—

P. J. Woods, Farm Foreman; James Forsyth, Horticultural Foreman; James McIntosh, Mechanical Foreman. It is now a matter of no longer delay that these gentlemen

receive full remuneration for their services; they get no perquisites or allowances whatever, and, as they can command more elsewhere, it is surely but fair to pay for what we get. The responsibility and educational requirements of their respective offices well demand an increase of salary. To this I beg the prompt attention of the Government.

As also of James Stock, Student Instructor; S. H. Shuttleworth, Assistant Superintendent of Experimental Department; Archibald Parker, Shepherd; E. H. Barclay, Cattleman.

And, as much of our success lies with student help, I take great pleasure in naming James Duthie, Guelph—now of Manitoba—for experimental help in cattle fattening; W. Gilpin, Ottawa, for bull management; W. Monteith, Huron, for bull management; H. Raikes, Barrie, for superintendence of fencing; W. H. De Veber, St. John, N. B., for experimental help in cattle fattening; A. McIntosh, Guelph, for experimental help in cattle fattening; W. F. Creelman, Collingwood, for assistance in mechanical department; J. Robinson, St. Thomas, for help in fattening experimental cattle; C. H. McNish, Lyn, for milk testing experiments; and D. McClennan, Glengarry, for experimental sheep feeding.

IV.—Cattle already on Hand for 1883 Sale.

Shorthorns—

Bull out of Beta, imported at a cost of $1,400, by Socrates of Hunter's herd, Alma, Ontario.
Heifer out of Louan of Brant 5th, by Prince Hopewell.
Heifer out of Cambridge 10th, by Baron Berkely of the Stone herd, Guelph.

Aberdeen Polls—

Bull out of Eyebright, by Gladiolus.
Bull out of Sybil's Darling 2nd, by Meldrum.
Heifer out of Leochell Lass 4th, by Gladiolus.
Heifer out of Haughton Lass, by Meldrum.

Herefords—

Heifer out of Heatherhill, by Hopedale.
Heifer out of Princess Louise, by Hopedale.
Heifer out of Princess Mary 2nd, by Hopedale.

Ayrshires—

Bull out of Juno 2nd of Drumlanrig, by Stonecalsey.
Bull out of Flora 3rd of Drumlanrig, by Stonecalsey.
Heifer out of Beauty of Drumlanrig, by Stonecalsey.

V.—Our Fat Cattle and Sheep at Exhibitions.

As reported to you in our experimental advance issue of June last we exhibited a pen of thirteen fat shearling wethers of the various grades specified, and five head of cattle—one heifer and four steers. They were not put in competition, as being the best policy in our circumstances. That they were favourably commented upon is not saying too much, and the following card that accompanied them seemed to meet every kind of enquiry:—

Four Steers, as Specimens for Exportation, not in Competition.

Breed—Grade Shorthorns, two-thirds bred.
Age—Average, 920 days—2½ years.
Weight—"Chancellor," 1,680lb; "Champion," 1,530lb; "Commander," 1,605lb; "Conqueror," 1,595lb; average, 1,602lb.
Increase—1.73lb per head per day since birth.

Food—Daily for 324 days: Corn, peas, oats, in equal parts, 10lb; mangolds, turnips, for six months, 35lb; green fodder, for four months, 75lb; oil cake, for three months, 4lb; bran, 2lb; Thorley's food, ¼lb.

Cost of Production—Per head, $133.

Manure Value—Per head, for last twelve months, $55.

Present Value—Per head, $121.

Profit realized—Per head, $43.

Shorthorn Heifer, five years old on 17th September, 1882.

Weight, 1,905lb; increased 2 1/10lb per day during last seven months.

Experimental Feeding—Corn gave daily increase per head, 1.91lb; peas, 1.83 lb; oats, 1.60lb.

Twelve Fat Wethers, as Specimens for Exportation, not in Competition.

Breeds—First crosses of Leicester, Oxford Down, Shropshire Down, South Down, and Merino rams with Canadian ewes.

Age—Shearlings, 18 months.

Weights—Per head, average: pure bred Leicesters, 265lb; Leicester Grades, 220lb; Oxford Down Grades, 210lb; Shropshire Down Grades, 210lb; South Down Grades, 180lb; Merino Grades, 150lb.

Food—Peas, oats, bran, hay, green fodder, and oil cake.

Wool—Washed, per head: Cotswold Grade, 9lb, 22 cts.; Leicester Grade, 8lb, 22 cts.; Oxford Down Grade, 9lb, 28 cts.; Shropshire Down Grade, 8lb, 35 cts.; South Down Grade, 7lb, 35 cts.; Merino Grade, 6lb, 35 cts.

Balance Sheet.—Manure not Credited.

	Carcass.	Wool.	Cost.	Balance.
	$ c.	$ c.	$ c.	$ c.
Leicester Grade	11 00	1 76	8 10	4 66
Shropshire Down Grade	12 60	2 80	7 00	8 40
Oxford Down Grade	12 60	2 52	7 40	7 72
South Down Grade	11 70	2 45	6 00	8 15
Merino Grade	7 50	2 10	5 50	4 10

These catttle and sheep were almost faultless of their kind, and were specially interesting because everybody knew what was before them. The exact breeding, age in days, the food in quantity and cost, the weight of each, value of manure received, and the whole cost of production, with profits exactly in every item. It will be understood that the object of the experiment was not to produce the greatest weight of two-year-old steers *irrespective of cost*, but to do so with the ordinary kinds of food, and not by any pampering, as is very common now with molasses and other nic-nacks.

In November we gave Mr. Geo. Hood, of Guelph, a draft of six of these wethers to go to Chicago Fat Stock Show with others of his own. This draft was made up of:—

One Oxford Down,	2nd	cross,	weighing	221 lbs.;	lambed 10th April, 1881.
One Oxford Down,	1st	"	"	214 lbs.;	" 15th April, "
One Shropshire,	1st	"	"	220 lbs.;	" 29th March, "
One Southdown,	1st	"	"	213 lbs.;	" 9th April, "
One Leicester,	1st	"	"	231 lbs.;	" 20th April, "
One Leicester,	pure bred,		"	307 lbs.;	" 25th March, "

Average weight..... 235 lbs.

They were named, ear labelled, weighed, and a regular pedigree of each forwarded, so that no question could arise in regard to their production. At such a competition as Chicago any prize, or commendation even, is considered a big thing, therefore, it affords me much pleasure to record that the

First Premium was awarded the Oxford Down, second cross,
First Premium to pure bred Leicester,
Third Premium to Oxford Down, first cross, and
Third Premium to Leicester, 1st cross.

In addition to these Mr. Hood obtained nine other premiums, including two sweepstakes, and brought to Ontario one-third of the whole of the blue ribbons for sheep.

At Guelph Christmas Fat Stock Show the cattle were on exhibition, and for sale. They were purchased by Messrs. Franklin & Mallon, of Toronto, at an average of ten and one-half cents per pound, live weight. Weights were :—

Shorthorn heifer, five years and three months old	1,950	pounds.
Shorthorn grade steers, average 995 days old	1,800	"
	1,760	"
	1,680	"
	1,650	"
Average	1,756	pounds.

Two of these steers were bred by Mr. Rae, of Eramosa, and one by Mr. Black, of Fergus. Permit the following excerpt from the notice of the two enterprising and public spirited citizens of Toronto :—

"Ex-Ald. John Mallon and G. F. Frankland have purchased in Guelph, for a Christmas display, the four steers and Shorthorn heifer from the Ontario Experimental Farm, which were exhibited both in Toronto and Kingston during the past fall. They were not in competition, but were exhibited as specimen cattle for exportation.

"The four steers, named Chanceller, Champion, Commander, and Conqueror, had attained the great weight of 1702 lbs. average, showing beyond doubt that cattle averaging two and a half years old weighing such a weight demonstrates clearly that early maturity should be more studied than it is.

"Messrs. Mallon and Frankland will have accomplished their purpose in this large outlay and expense if our farmers will read and understand that by following the practical theories of Professor Brown in regard to early maturity, millions of dollars will be added to the wealth of the farmers of Ontario, and give us cattle for export second to none in the world."

The Special Live Stock Class at College.

As this Institution grew, year by year, it developed some things in farming more prominently than others ; among these has been the Live Stock interest. One of the very first cares of the Government was providing good samples of the more important breeds of cattle and sheep for student instruction. With such appliances we have not neglected practical application, and no young man who has been with us can say that he has not had every opportunity of making a very intimate acquaintance with cattle and sheep in all their practical bearings. Gradually, as we worked up this subject, there came enquiries of special import with reference to breeds of cattle and sheep suitable for the various conditions of our continent—enquiries regarding their conduct in our hands, and specially, enquiries as to whether the subject of live stock would be taught separately. At length the applications for the establishment of a "special live stock class" became so numerous that last spring you advised the opening of one, experimentally meantime, until experience should justify its permanency on the curriculum of the College. You will recall your own full personal explanation of this subject to the students in October last, immediately after which the class was opened. The number was limited to twenty, and out of thirty applications twenty are now in full study. I have no doubt President Mills will

indicate in his report what this class does when under his charge in the College—what they are doing outside is mine to explain : Coming out morning, or noon, as the case is, alternate weeks, the class is made into two equal divisions—one for cattle, the other for sheep, alternating daily. During the first hour the duty of each is to make an accurate inspection of the herd or flock, with the cattle-man and shepherd, in order to ascertain if anything requires immediate attention—such as disease, calving, etc.,—to note the same in their diaries, assist in any such attendance and generally make themselves acquainted with the condition of every animal. During the second hour, those on cattle receive practical lessons from the farm foreman, in judging, handling, and comparing breeds, and individuals, with special reference to beefing properties, and as Mr. Woods is also well up in marketing and the butcher's view of a carcass, the class obtain some excellent practice in cutting up the College beef, mutton, and pork. In addition, the classes as required attend any special case of live stock enquiry, as occurs pretty often among so many breeds, and no doubt when lambing season opens their time will be very fully occupied, day and night. The last hour is devoted in assisting to feed and make up for the night. Professor Grenside, has often occasion to take this class to outside practice with horses as well as cattle and sheep, so that altogether there exists no want of opportunities. All this is so arranged as not to interfere with the regular duties of the regular classes ; were it to do so, much of our good name would suffer. These then, with all the lectures, and practical class-room work by Professor Grenside and myself, go to fill a bill of plenty variety and substance. But there are also hours of study, when text-book reading and the extension of the diary, are placed as part of examination subjects. I may add that all our experimental feeding is also brought under the daily notice of this class.

The particular object of this special live-stock class is to fit young men, who have in view the breeding of thoroughbreds, the investment in ranche and runs, for themselves, and as managers of any of these for others.

The progress, to date, 15th Dec., is very satisfactory indeed. Business is marked in all the conduct of the class, and, as we have your instructions to be liberal and very firm with every individual, I trust you will hear of an unusually good record next Easter.

The present class is made up of one-third Europeans and two-thirds Canadians.

We use as a text-book, "Dr. Manning's Stock Doctor, and Live Stock Encyclopedia," as published by *The World* Publishing Co., Guelph.

AMERICAN FORESTRY.

Two words meaning much—how much no one at present alive will ever realize, and this is what strikes at the root of man's indifference on the subject, that is, that he cannot himself personally hope to receive all the benefits from the conservation of the present trees, and particularly from replanting. American returns must be smart, strong and undoubted ; the idea of permanency in the long after years does not concern us so much as *now ;* we are fond enough of speculating upon cause and effect, and, in this matter, delight in big talk, that indeed does not lack for as much soundness as Europe can produce, but it is talk largely only. Let us add to this phase of our life by submitting some thoughts on such an important subject, with the hope that we are not far off from acting up to what is preached.

The General Importance of Forestry in North America.

It is the experience of the world that more difficulty, in all its forms, is found in reclothing with trees where trees grew before, than it is to plant—not replant—a country for the first time. There is not only the practical fact of succession of cropping in its scientific and natural bearings as similarly realized, for example, in the the products of the farm, but the more serious one of the indifference of its population. It is just a piece of human nature everywhere, that what has been felt as common and every body's property, is no one's particular business when remedies are asked for in the exigencies of public affairs.

By Forestry is meant the whole science and practice of arboriculture ; the conserving, the care-taking, preservation and proper management of existing trees, and the replanting

of land for purposes now to be discussed. Speaking generally we are, and we are not, deeply concerned, as a nation, in the more modern views of forestry. In Europe it takes a shape that may never be realized here, because of one thing—that one thing is large proprietory, the possessing within *one man's* power all the area and class of soil suitable to profitable production on a large scale, so that even that one man can employ officers and men in such numbers as make profits certain. Cultivated America meantime is so subdivided as to effectually preclude all idea of sufficient massing of woods to receive equal results with Europe—but the day may come. Though not thus situated for forest culture, we are otherwise obliged to give it a place in our rural economy. It is especially applicable to any country that has been a forest by nature, where in some things nature has been unthinkingly trampled upon, and where agricultural progress now demands the aid of her sister science—arboriculture. We are not singular in these matters, and can sympathise with

What is being done in the Conservation and Re-planting of Forests in other Countries.

There is no country whatever that has made its agricultural history and does not now complain of want of trees. India, Australia, Europe and the United States, all tell their story of overclearance, of the need of conserving, and of the necessity of replanting. Their greater years than ours has given experience that should encourage, and dismiss all doubts on our part. The effects of judicious re-clothing are already subjects of congratulation, and of yearly revenue in competition with agriculture, so much so indeed with some that the other is not uncommon talk with proprietors. India has her standing army of foresters, trained to all cunning in sylvan matters, at European schools; Australia can already boast of its "Forest Board,"—its conservator of forests, tree nurseries, extensive enclosures planted and to be planted, and a whole system of arboriculture of the most encouraging kind, and the United States, though doing more talk than spade work, are unquestionably on the very margin of a revolution, they have not gone through the forest without "seeing some firewood."

The Objects of Conserving and Replanting are not a few.

Most people think of trees, first of all, as means of shelter—under several forms. We like shelter for buildings, shade for ourselves, shelter and shade for animals in the field, and shelter for farm crops. These alone would make up a large value in any district where required, and would justify all the cost and subsequent attendance. Yet, we have another aspect of the question that takes an equally strong place in our regard: *Climate* is not alone a matter of great outside causes, but one intimately related to local influences, among which trees are pre-eminent. We have no time to show how temperature, rain-fall, moisture, and evaporation are directly influenced by a small or large surface of trees—how therefore water in every form is in the hands of trees for local distribution. This second duty of forestry as a science and practice would even seem to swallow up the previous question, and are consequently inducements alone to its prosecution on our part. Were neither of these sufficient, however, to convince, the third great reason for tree cultivation will surely convert even the most stiff-necked among us. It is no matter of doubt, under average conditions, in any country, that tree culture is more profitable as a crop than its own agriculture, year by year. This position is not open to question, but clear and marked in all experience where age has given time for proof. And lastly, some men are satisfied when large expenditure secures what to them is all in all—ornament; and assuredly ornament is value. Who would not give $500 more for a farm where the buildings are set off by just the kind, number, and proper position of trees and tree clumps?

The Area of Land in North America

is not an unknown thing. There is no case in Europe as regards *small propriety*, having recently occupied a forest country, and where extensive clearing took place for agricultural development. But it is not true that the American continent is now poorly wooded in comparison with other countries; the United States can show twenty-five,

and Canada fifty per cent. of the cultivated districts, as still under trees. This is possibly larger than any other continent, if we except the northern part of Europe, where agriculture is necessarily at a discount, and where forest is practically untouched. What then is the cause of our discontent? if on an average, *one-third* of populated North America is still under forest, why do we advocate conserving and replanting? or, in other words, what are

The Requisite Proportions of Tree Surface to that under Agricultural Crops?

This is just one of the things that we do not know, and that we are not likely ever to know as a point for general practical guidance. The conditions affecting climate are so various as affected by latitude, altitude, aspect, soil, sea or lake neighbourhood, and vegetation, that no possible number of observations, in any length of time, could say how much for one district is so much for another. However, men do come to realize through science and practice—practice especially—that a farm, or a district, needs the protection in certain places, and thus by such a simple guidance alone, a country could easily be reclothed to the extent required, at least for shelter, if not for regulation of climate, or of sufficient area as a cropping investment; this point of immediate shelter is, therefore, within everybody's knowledge, and needs no scientific recognition, and should not require any governmental spurring. But the greater field of climate, as an unknown one practically in this relation, is more a national problem, and still very much a scientific enquiry, and what it will have to say in regard to the proportion of trees to farm crops no one can tell. Of course, if we disregard everything but the direct profits from trees as a crop upon land, then we shall likely override all other deductions, and possibly bring back the days of laziness and unhealth. Viewing trees in all their relations, I am of opinion that upon an average of conditions in Ontario—one-fourth of the land should be under trees, and as this is just double what we have at present, there rests the apparent inconsistency of wanting to conserve and replant, all the while that we have double what is needed. This brings out the fact that it is the *irregular distribution* of tree surface in our case which gives trouble, that some parts have more than required, and others have been over-cleared. So then

The Existing Condition of our Forests

is the very first consideration in this enquiry. What is the condition of all our woodlands, both in the older and newer townships at the present moment, and what should be done with them in order to their best maintenance—such a maintenance as shall secure annual revenue, shelter, and climatic amelioration along with the due agricultural development?

Outside of the lumbering interest there is no enclosing, preserving, caretaking, or conserving in any sense, except the right of individual ownership, some of whom do act the forester, but nationally there is nothing recognized, and hence waste. The average bush of North America is a beautiful sight, and yet a sad one. The artist must revel in its variety of form, and foilage, but the fighting for place, the scraggy monarch of three hundred years, smothering even as he dies, scores of plants that but for him would attain to value; the general want of light and air, and otherwise a decay and loss, recognized only by those who are scientifically and practically foresters. I do not mean that our forests in every case should be managed similarly to those in Europe, because much of our best timber requires very different conditions, but similar principles ought to guide our management. While then, we owe a steady eye to progressive judicious replanting, it is above all others our first duty to manage well what we do possess. It will be the cheapest, the most rapid, and the most sure method of re-adjusting matters—along, no doubt, with a certain replanting of cleared land. No fear need exist in regard to

The Adaptability of Soils and Climate to Rapid Results,

for nature herself has already shown us what to do both in repeating the same kind of crops, and in the proper rotation of trees, by sections of the country. But that nature has been the best guide in most things is not admitted. We cannot follow her in mode of thinning out so many annually, in making branchless stems, and therefore leafless and shelterless trees, comparatively. It is sound in practice, though not in theory, that

ten trees, of certain kinds, standing within a given area, will afford less shelter, less wind break, than three trees of exactly the same sort, properly managed on the like area. We have soils and climates wherewith to do almost anything in tree life—from the pine of the north, which luxuriates in an apparently bare rock cleft, to the walnut of the south, that must send its carroty root several feet into a rich soil. European forest revenue begins, as an average, fifteen years after planting; that of America ten years afterwards.

As the subject grows upon our attention, we are next concerned with

What Parts of the Country Should be Conserved or Replanted.

And in this part of the study it is obvious that our views cannot be confined to single farms, or even special sections. Referring, as we must, to the great over-ruling influences, as previously indicated, we have to deal with geographical features that may embrace thousands of acres that have to be subserved by one, or more, massing of trees. Just where to conserve or replant, how much on the spot, or spots, in what particular form—belt, clump, or block—and with what kinds of trees, so as to gather and dispense all the virtues that trees are known to possess, is the great problem of the future. To say that we should replant only our less valuable soils is nonsense, though sensible enough from the cultivated standpoint; that high lands should be conserved or reclad as against lower parts is largely true, though not generally applicable, and that conserving and replanting must go hand in hand, and take place anywhere as found necessary though experience, is correct in every sense.

Following this view of the subject there is naturally that of

Suitability of Certain Kinds and Forms of Trees for Special Purposes,

Whether for neighbourhood of dwellings, road-side shade, shelter-belts, field clumps, or for more extensive planting, efficiency and permanacy in every example are the primary considerations. It is not difficult, because experience is extensive, to decide on those species of trees for roadside, and house shelter, but much has not been done for the others, and so some advice will not be out of place.

To attain all the objects desired in replanting it is obvious that many varieties together in one clump or plantation would be indispensable: early shelter and rapid returns for the money invested would be best secured by certain kinds of trees more than others; such trees would also serve as nurses to others, and permanency in their case would not be wanted, but we would desire in their character a full and spreading foliage coming early and remaining late in the season, or even throughout the winter, to attain size in ten or fifteen years, and to be of a quality that would fetch a handsome revenue per acre for the period since planting. The removal of these gradually from the plantation as required by the progress of the other sorts would form, as it does now in other countries, a nice scientific and practical study. The second class of trees in such a plantation should be of a less spreading habit and more of upright growth so as not to interfere too early with the first and third classes; they should also begin to offer some revenue at thirty years, because the most of them would have to give place to the third or standard class, in about fifty years from the date of planting. In all well regulated planting one set of trees is held as those to remain as long as good management, their own natural habits, and a proper time to harvest without loss, will allow. These are the third class referred to, and necessarily we desire a slower growth, a habit that will not spoil by close neighbourhood—a sociable plant therefore, giving high value when cut, maturing late, holding its maturity long, giving low branches and many leaves, a gatherer and holder of atmospheric moisture, a wind sifter, and holding electric communication with cloud and other trees at a distance. We have such trees of several varieties.

The preparation of the land, detailed method of planting, distance apart of trees, including fencing, drainage, knowledge of enemies and friends in nature, and all the management throughout in order to attain the highest results are too much for my time on this occasion.

The farmer's view of a wood, is grazing. Modern Arboriculture does not recommend

it in Europe at any stage of growth, yet, with us in the more difficult maintenance of permanent pasture, I see no objection to the admission of sheep during the second, and cattle during the late cropping periods.

The duty of legislatures, in regard to existing woodlands, and replanting, is being pressed upon our attention from various quarters, and unquestionably ere long every progressive country must take some action. How much to do, and what not to interfere with, will make the bill. That the Ontario Government has a warm side to trees is well known, and it is to be hoped that whatever they do will be early, full, good, rapid, and permanent.

American Forestry will have no place in all its scientific and practical value until one of two things be accomplished: one is the conviction on the part of our farmers, of the necessity of conserving and replanting, therefore their education up to these, and the other is the power by Government to resume parts of the country for conserving and replanting. Both will be difficult; the former would be the slower, but eventually the most thorough because of self-interest; the latter would be more immediate and possibly less efficient, practically, though scientifically better applied. No large number of various interests could be so well arranged as by a company, and therefore Government will have to become foresters in all the many details of the profession. Were a properly conducted system of forestry begun in 1884, the results would be so strong in the year 1900 as to astonish. It would possibly change much of our present agricultural practice, it would certainly enhance the production of winter wheat to an immense extent; it would enable us to graze nearly two for one by checking rapid evaporation and encouraging permanent pasture; it would largely nullify droughts, perpetuate streams, and generally make climate more regular and reliable.

To those acquainted with Arboriculture as a profession in all its national bearings, an annual expenditure of $50,000 has in other countries made an *annual* crop revenue of $25,000 within fifteen years, in addition to the *triple* value of climatic amelioration.

Concluding Remarks.

In concluding our Eighth Annual Report, I think it is perfectly in place to express regret at your own retirement from political life, and particularly the change it will make with the Agricultural College and Experimental Farm. Your open, liberal, strict, and impartial management of all our concerns has given much satisfaction, and though "out of office" it is to be hoped you will always be interested in our welfare.

There is no Government appointment so intimately associated with the well-being of so many in any country as that of Commissioner of Agriculture—none so honourable, and certainly none requiring so much aptness, because of its immense constituency as well as the yearly breaking of new ground. Our College history and that of all other Agricultural Colleges stands as an example of these: Designed for the benefit of farmers, they have had to bear the brunt of all their uncharity, prejudice, and even jealousy. Few, how very few, have said "Let us help the Government to make this the best Agricultural College and Experimental Farm in the world; it is ours, and as it is something new, really an experiment, we shall give it the very best charity and unprejudiced support, free of all jealousy." Now, at the present moment, our Institution is acknowledged by the world, as one of the best if not the best of its kind, and as you know, this has been attained, not by the self-interested support of farmers, but by the unflinching purpose of its originators and management. I could very easily name to you how many of our visitors have said, "Well done so far, try and do better next time." I have named uncharity and prejudice, the former is a very common item anywhere, the other can be got over as time advances, but that jealousy which is the apprehension of superiority is likely to be our black beast for some time longer.

The farmers of Ontario should determine now to place their Agricultural College and Experimental Farm the highest that science and practice can possibly do.

I have the honour to be, Sir,

Your obedient servant,

W. Brown,

Professor of Agriculture, Farm Manager, and Experimental Superintendent.

APPENDIX.

INVENTORY AND VALUATION OF LIVE STOCK AND IMPLEMENTS ON HAND, 1st DECEMBER, 1882.

Horses.

13	Working horses		$1,800 00

Cattle.

1	Shorthorn bull	$500 00	
5	" cows	1,300 00	
3	" calves	300 00	
1	Hereford bull	800 00	
3	" cows	1,000 00	
2	" calves	200 00	
1	Aberdeen Poll bull	1,000 00	
2	" " cows	2,000 00	
4	" " calves	500 00	
1	Ayrshire bull	200 00	
4	" cows	300 00	
3	" calves	150 00	
1	Devon bull	200 00	
1	" cow	100 00	
1	Jersey cow	300 00	
1	West Highland bull	100 00	
34	Total value of thoroughbred cattle		$8,950 00
11	Shorthorn grade cows	$500 00	
9	" " calves	100 00	
2	Ayrshire grade cows	70 00	
1	Aberdeen Poll grade cow	100 00	
1	" " " calf	50 00	
1	Hereford grade steer calf	20 00	
1	Jersey grade heifer calf	10 00	
4	Canadian cows	170 00	
17	Fattening steers of five grades	650 00	
81	Head in all		$1,670 00
	Total value of cattle		$10,620 00

Sheep.

28	Cotswold ewes	$800 00	
22	Southdown ewes	850 00	
12	Leicester ewes	350 00	
10	Oxford Down ewes	500 00	
12	Shropshire ewes	700 00	
84			
36	Lambs, of kinds	700 00	
8	Stock rams, of six breeds	1,300 00	
128	Thoroughbreds		
15	Grade ewes	150 00	
40	Fattening wethers	350 00	
183	head. Total value of sheep		$5,700 00

SWINE.

3 Boars, Berkshire, Essex, and Poland China	200 00	
4 Brood sows	300 00	
3 Scotch Collie dogs	50 00	
		$550 00
Total value of Live Stock		$18,670 00
Value of farm implements, per Inventory	$3,900 00	
" of garden implements, per Inventory	1,250 00	
" of mechanical tools, per Inventory	480 00	
" of implements in Experimental Department	250 00	
		$5,880 00
		$24,550 00

PART VII.

REPORT

ON

HORTICULTURE AND ARBORICULTURE.

To the Honourable the Commissioner of Agriculture:

Sir,—It becomes my duty this year to report, however briefly, on the practical horticultural work of this Institution, and in this particular I fear the department will not receive the justice it has hitherto done at the hands of Professor Brown, who, in consequence of his many other duties, has been relieved of the direct charge; but, although he has ceased to take an active part in the working of the department, I hope he will when required, continue to give that friendly advice and direction which he has always so readily given and which he is so capable of bestowing.

As a general observation I would say that we have now come to the close of a very busy season. The additional time and labour spent on extra work, spring planting, etc., somewhat retarded other operations. Considering the increased area now attached to the department—including arboretum, vineyard, orchard, and small fruits, as well as kitchen and flower garden, in all comprising over fifty acres—it was no easy matter, with the class of labour at our disposal, to accomplish the work in its proper season. Indeed, it was not until the cropping season was over that we were able to get the work into anything like desirable shape. The general result has, however, been very satisfactory. In the kitchen garden all the ordinary classes of vegetables were produced in abundance, and the staple varieties, such as potatoes, cabbage, peas, beans, tomatoes, celery, and roots were much in excess of the average crop.

In the flower garden we have now a very good assortment of bedding or half-hardy plants, and their general appearance, due to the copious and seasonable showers throughout the summer, was all that could be desired. The plants growing luxuriously and blooming freely from June to the middle of October, and sufficient stock is now secured to propagate from, according to our room and convenience, for next year. We have still a very limited collection of hardy herbaceous or border plants, but hope to have it increased during the coming season by some of the less common but more choice varieties.

Arboretum.

In 1880, under the direction of the Fruit Growers' Association of Ontario, an Arboretum was commenced in which it was intended to have at least a single specimen of all the trees or shrubs, native or exotic, that were thought at all likely to stand our climate. The ground was selected comprising about two and a-half acres on the western front of the College buildings, partly sheltered on the western and northern sides by a close line of native spruce, some years established. About sixty different species and varieties of deciduous and evergreen trees and shrubs were planted and did well for the summer, but the unusually severe winter of 1880-1 caused quite a few vacancies which in the spring of 1881 were replaced and a very large addition made.

The following list shows those which have stood one winter, and have now the growth of two seasons :—

DECIDUOUS TREES.

Acer saccharinum, sugar maple.
" colchicum rubrum, scarlet maple.
" Nances var. maple.
" oregoni, Oregon maple.
" pseudo platanuus, sycamore
" platanoides, Norway maple
" spicatum.
" striatum, striped-barked maple
" Tartaricum, Tartarian "
Acacia julibrissin, Mimosa tree.
Alnus glutinosa, common alder.
" laciniata, cut-leaved alder.
" maritima, sea side "
Anona triloba, pawpaw tree.
Aralia spinosa, thorny aralia.
" japonica, Japanese aralia.
Amelanchier botryapium, June berry.
Ailantus glandulosa, celestial tree.
" Chinensis, Chinese variety.
Æsculus hippocastanum, horse chestnut
" glabra, smooth "
" flava, yellow "
Betula lenta, sweet birch.
" populifolia, poplar-leaved birch.
" rubra, red " "
" papyracea, paper birch.
" lutea, yellow "
" alba purpurea, purple-leaved birch.
Castanea vesca, Spanish chestnut.
Catalpa bignonoides, trumpet flowered catalpa.
" nana, dwarf catalpa.
" speciosa, showy catalpa.
Carya alba, shell-bark hickory.
" amara, bitter-nut "
" aquatica, swamp "
" microcarpa, small-fruited hickory.
" olivæformis, Pecan-nut "
" porcina, hog-nut "
" sulcata, furrowed "
" tomentosa, woolly "
Celtis occidentalis, American nettle tree.
" Australis, European " "
" pumila, dwarf " "
Cercis Canadensis, American Judas tree.
" siliquastrum, European " "
Cerasus Padus, bird cherry.
" Virginiana, Virginian cherry.
" flora pleno, double flowering cherry.
" carnea pleno, double flesh-coloured cherry.
" ranunculæ flora, ranunculus flowered cherry.
Fagus Americana, American beech.
" sylvatica, European "
" purpurea, purple-leaved beech.
Fraxinus Americana, white ash.
" platycarpa, broad-fruited ash.
" sambucifolia, black "
" quadrangulata, blue "
" juglandifolia, walnut-leaved ash.
" excelsior, taller ash.
" " aucubæfolia.
" " jaspidea, yellow-barked ash.
" " heterophylla, various-leaved ash.
" " salicifolia, willow-leaved ash.
" " spectabilis, variegated ash.
" " Theophrasti.
Gleditschia horrida, strong-spined honey locust.
" triacanthos, three-thorned honey locust.
Gymnocladus canadensis, Kentucky coffee tree.
Juglans nigra, black walnut.
" cinerea, butternut.
Kolreuteria paniculata, panicled kolreuteria.
Laurus sassafras, sassafras tree.
" benzoin, Benjamin "
Liquidambar styraciflua, sweet gum.
Liriodendron tulipifera, tulip tree.
" integrifolia, entire-leaved var.
Magnolia acuminata, cucumber tree.
" glauca, swamp cucumber tree.
Nyssa multiflora, sour gum.
Negundo fraxinæfolium, ash-leaved maple.
Ostrya Virginica, ironwood.
Platanus orientalis, oriental plane tree.
" occidentalis, western plane tree.
Paulownia imperialis, Empress tree.
Pyrus laciniata, cut-leaved service tree.
" aucuparia, mountain ash.
Populus alba, abele tree.
" monilifera, necklace-bearing poplar.
" angulata, Carolina "
" angustifolia, narrow-leaved "
" Empress Eugene "
Quercus aquatica, swamp oak.
" alba, white "
" bicolor, two-coloured "
" Bannisteri, Bannister's oak.

DECIDUOUS TREES—*Continued.*

Quercus cinerea, ash-coloured oak.
" coccinea, scarlet " "
" imbricata, tiled "
" lyrata, swamp-post "
" macrocarpa, long-fruited oak.
" nigra, black Jack "
" obtusiloba, post "
" palustrus, marsh "
" prinus, prince's chestnut "
" rubra, red " "
" rubur, sessil-fruited "
" tinctoria, dyer's "
Salix caprea, Kilmarnock willow.
" annularis, ring-leaved "
" candida, white "
" discolor, two-coloured "
" Forbyana, Forby's var. "
" Japonica, Japanese "
" myricoides, gale-like "
" pentandra, bay-leaved "
" rex, royal "
" purpurea, purple "
" Russelliana, Russell's "
Salix rosmarinefolia, rosemary-leaved willow.
" salmoni.
" Villarsiana, Villar's variety willow.
" vitellina, yellow-branched "
" alba, common white "
Salisburia adiantifolia, maiden-hair tree.
Staphylea trifolea, bladder-nut tree.
Sophora japonica, Japanese Sophora.
Tamarix tetranda, tamarisk.
Taxodium distichum, deciduous cypress.
" Chinensis, Chinese "
" pendula, new weeping "
Tilia Europæa, linden.
" Americana, basswood.
" heterophylla, various-leaved,
Ulmus pyramidalis, lofty elm.
" montana, mountain elm.
" fastigiata, peaked "
" purpurea, purple-leaved elm.
Zanthoxylon fraxineum, ash-like toothache tree.

SHRUBS.

Andromeda Mariana, Maryland andromeda.
" arborea, tree-like andromeda.
" racemosa, branchy andromeda.
Amelanchier nana, medlar tree.
Amygdalis nana, dwarf-rose almond.
" alba, dwarf-white almond.
Azalea viscosa, clammy Azalea.
Berberis vulgaris, common barberry.
" purpurea, purple-leaved barberry.
Callicarpa purpurea, purple-leaved calicarpa
Ceanothus Americana, American red-wood.
Calycanthus floridus, florid allspice.
Cerasus pumila, dwarf cherry.
Cephalanthus occidentalis, western buttonwood.
Chionanthus Virginica, white fringe.
Clethra alnifolia, alder-leaved clethra.
Cotoneaster baccilaris, cotoneaster.
" floribunda, many-flowered cotoneaster.
" obluta.
" accuminata, pointed cotoneaster
" frigida, frigid cotoneaster.
" buxifolia, box-leaved cotoneaster.
Corylus avellana, filbert.
" purpurea, purple cob-nut.
Colutea arborescens, bladder senna.
Cornus alba, white dogwood.
" alternifolia, alternate-leaved dogwood.
" florida, flowery dog-wood.
" mascula, male-cornel dogwood.
" paniculata, panicled dog-wood.
" sericia, silky dogwood.
" sanguinea, bloody dogwood.
" stricta, upright dogwood.
Cratægus oxyacantha, hawthorn.
" " variegata, var. hawthorn.
" " rubra splendens, red hawthorn.
" " Douglasii, Douglass hawthorn.
" crus-galli, cockspur thorn.
" apiifolia, parsley-leaved thorn.
" cordata, heart-leaved thorn.
" Paul's scarlet thorn.
" flava, yellow thorn.
Deutzia crenata, crenate Deutzia.
" " pride of Rochester Deutzia
" florepleno, double flowering Deutzia
" scabra, rough Deutzia.
" fortuni, fortune's Deutzia.
" gracilis, slender Deutzia.
Eleagnus flava, yellow oleaster.
" parvifolius, silver-thorn oleaster.

SHRUBS—*Continued.*

Euonymus Europæus, burning bush.
" " variegata, var.
" Americana, Am. var.
Forsythia viridisima, golden bell.
" suspensa, drooping golden bell.
Hamamelis Virginica, witch hazel.
Halesia tetraptera, snow-drop tree.
" meehani, var.
Hibiscus syriacus, althea.
" alba, white althea.
" purpurea, purple althea.
" carnea, flesh colored althea.
" variegata, variegated althea.
" Lady Stanley var.
Hydrangea quercifolia, oak-leaved hydrangea.
Kerria Japonica, Japanese kerria.
" flavescens, scented kerria.
" kalmeanum, Kalum's kerria.
Hypericum ascyron, ascyron-like St. John's wort.
" prolificum, prolific St. John's wort.
Itea Virginica, Virginian itea.
Lonicera grandiflora, bush honeysuckle.
" orientalis, eastern honeysuckle.
" philomelæ.
" Siberica, Siberian honeysuckle.
" Tartarica, Tartarian honeysuckle.
" xylasteum, fly honeysuckle.
Ligustrum vulgare, common privet.
" buxifolia, box-leaved privet.
" myrtifolia, myrtle-leaved privet.
" ovalifolia, ovate-leaved privet.
" Stauntoni, Staunton's privet.
" Japonica, Japan privet.
Magnolia Soulangeana, Soulange's magnolia
Myrica cerifera, candleberry.
Pavia macrostachya, long-spiked pavia.
Philadelphus coronarius, garland mock orange.
" flore pleno, double flowering mock orange.
" Gordonianus, Gordon's mock orange.
" Columbianus, Columbian mock orange.
" tomentosus, woolly-leaved mock orange.
" zeyheri, var.
" keteleeri, var.
Prunus triloba, three-lobed plum.
" Americana, American plum.
" chicosa.
" umbellata.
Ptelia trifolia, shrubby treefoil.
Pyrus Japonica, Japan pear.
" variegata, variegated pear.
" malus pruno, plum-leaved crab.
" semipleno, semidouble.
" cardinalis.
" floribunda, many-flowered crab,
" Siberica, Siberian crab.
Rhus copallina, gum copal sumach.
" cotinus, Venetian sumach.
" glabra, smooth sumach.
" typhina, fever sumach.
" trilobata, three-lobed sumach.
Rhamnus catharticus, purging buckthorn.
" Carolinianus, Carolina buckthorn
" Frangula.
Ribes aureum, golden currant.
" utah, blue currant.
" nigra, black currant.
" lutea, yellow currant.
" floridum, florid currant.
" Gordonii, Gordon's currant.
" Sanguineum, blood-flowered currant.
Rosa rubiginosa, sweet briar.
" rugosa, rough briar.
Robina hispida, rose acacia.
Rubus flore pleno, double flowering bramble
Sambucus racemosa, racemosa elder.
" variegata, variegated elder.
Spiræa aurea, golden meadow sweet.
" Billardi, Billard's meadow sweet.
" carpinæfolia, horn-beam-leaved meadow sweet.
" callosa.
" callosa alba, white meadow sweet.
" crinata, crenat-leaved meadow sweet
" chamædrifolia, germander-leaved meadow sweet.
" Douglassi, Douglass's meadow sweet
" fortuni, fortune's meadow sweet.
" Indica, Indian meadow sweet.
" nobleana, noble meadow sweet.
" opulifolia, opulus-leaved meadow sweet.
" prunifolia, plum-leaved meadow sweet.
" regeliana.
" sorbifolia, sorbus-leaved meadow sweet.
" salicifolia, willow-leaved meadow sweet.
" semperflorens, ever-flowering meadow sweet.
" Thunbergi, Thunberg's meadow sweet.

SHRUBS—*Continued.*

Spiræa vaccinæfolia, whortleberry - leaved meadow sweet.
Syringa vulgaris, common lilac.
" vulgaris alba, white lilac.
" rubra insignis, red lilac.
" Dr. Stockhardt's lilac.
" vallettiana.
" purpurea flore pleno, double purple lilac.
" gloire de moulins.
" oblata.
" josikæa, deep-flowered lilac.
" Persica, Persian lilac.
" racemosus, branchy lilac.
" variegata, variegated lilac.
Vaccinium corymbosum, whortleberry.
Vitex agnus-castus, chaste tree.
Viburnum acerifolium, maple-leaved viburnum.
" lantanoides, lantana-like viburnum.
Viburnum lentago.
" nudum, naked viburnum.
" sterilis.
" oxycóccos, cranberry-like viburnum.
" prunifolium, sheepberry viburnum.
Wistaria magnifica, large wistaria.
" sinensis.
" alba, white wistaria.
" fontescens.
" multifuga.
" Japonica, Japanese wistaria.
Weigela rosea, rose-coloured weigela.
" amabilis.
" purpurea, purple weigela.
" variegata, variegated weigela.
" multiflora, many-flowered weigela.
" hortensis nivea.
" græneweigenii.

EVERGREEN TREES AND SHRUBS.

Abies alba, white spruce.
" Canadensis, hemlock spruce.
" excelsa, Norway spruce.
" engelmani.
" menziesii.
Andromeda calyculata, small calyxed andromeda.
Akebia quinata.
Biota orientalis, Chinese arbor vitæ.
" aurea, golden arbor vitæ.
Buxus Handworthia, Handworth's box-wood.
" sempervirens, box-wood.
Euonymus radicans, spindle tree.
" variegata, variegated tree.
Genista scoparius, Scotch broom.
Ilex opaca, Japan holly.
Juniperus communis, common juniper.
" prostrata, trailing juniper.
" occidentalis, western juniper.
" sabina, common savin juniper.
" Suecica, Sweedish juniper.
" virginiana, red cedar.
Kalmia latifolia, broad-leaved Kalmia.
" angustfolia, narrow-leaved kalmia.
Mahonia aquifolia, holly-leaved mahonia.
Pinus Austriaca, Austrian pine.
" benthamiana.
" inops, Jersey pine.
" Lambertiana, Lambert's pine.
Pinus Laricio, Corsican pine.
" mugho, mugho pine.
" pumila, dwarf pine.
" pungens, pungent pine.
" pinaster, cluster pine.
" ponderosa, heavy-wooded pine.
" mites.
" rigida, rigid pine.
" strobus, Weymouth pine.
" sylvestris, Scotch pine.
Podocarpus Japonicus, Japan podocarpus.
Retinospora obtusa, blunt-leaved retinospora
" ericoides, heath-leaved retinospora.
" pisifera.
" squarrosa, spreading retinospora.
" plumpsa, plum-like retinospora.
Thuja ericoides, heath-leaved arbor vitæ.
" gigantea, large arbor vitæ.
" globosa, globe-shaped.
" spiralis.
" George Peabody var. arbor vitæ.
" glauca.
" pumila, dwarf arbor vitæ.
" pyramidalis, tall arbor vitæ.
" Siberica, Siberian arbor vitæ.
" tartaricum, Tartarian arbor vitæ
Taxus Canadensis, American yew-tree.

At the origin of the Institution, the approaches to and roads in front of the buildings were but roughly formed, and the lawn laid down with the ground, very much in its natural, uneven state, and not in keeping with the proportions and architectural appearance the buildings have since assumed.

Early last spring the matter was taken up, plans procured and approved by the Government, the work was commenced in the Fall, and considerable progress has been made.

To admit of the grading required, it was found necessary to lift the whole arboretum, which has been done with the greatest possible care, and the plants laid in and protected in a sheltered border until the coming spring, when they may, as intended, and as provided for in the plan, be replanted into fresh ground, arranged in groups according to their respective families, or natural orders, and correctly labelled, which I think will be all that can be desired for educational purposes, interesting to visitors, and I trust a credit to the Province.

Orchard.

The old fruit trees to the south and west of the College, from the building and other changes going on in the grounds, have been greatly reduced in number and, in carrying out the adopted plan of improvements, the remainder will soon have to be removed. In the spring, up to the season of flowering, there was every prospect of an abundant crop, but, in common with most orchards throughout the Province, suffered from a blight to such an extent that only about thirty barrels of very indifferent fruit was secured.

The young orchard selected and commenced two years ago, under the supervision of a Committee of the Fruit Growers' Society, now extended to over seventeen acres, about three acres of which are planted with small fruits between the rows of the larger trees, has done well, and made good growth last summer, the failures in last year's planting not exceeding two per cent., apart from a few causalties incident to cultivation. It is intended to have all the vacancies filled up in the spring.

The following is a complete list of what the Orchard now contains, with the number of each variety :—

Apples.

Varieties.	no.	*Varieties.*	no.
Roxbury Russet	8	Peck's Pleasant	5
Rhode Island Greening	20	Vandevere	5
Grime's Golden Russet	15	Shiawassee Beauty	10
Wagener	19	Duchess of Oldenburg	25
Yellow Bellflower	20	Gravenstein	25
Swaar	10	Alexander	10
Pomme Royal	20	Chicago	10
Baldwin	21	Fall Pippin	10
Northern Spy	50	Blenheim Orange	8
Golden Russet	25	Maiden's Blush	5
American Golden Russet	25	Hathornden	20
S. Pomme Grise	25	Newton Pippin	2
English Russet	5	Melon	10
Stott's Russet	6	Early Harvest	10
Fameuse	10	St. Lawrence	20
King of Tomkins County	10	Red Astracan	10
Talman's Sweet	30	Keswick Codlin	10
Ribston Pippin	20	Benoni	9
Twenty Ounce	10	Sweet Bough	5
Seek no Further	5	Haas	2
Mann	10	Bottle Greening	2
Beauty of Kent	5	Fallawater	2
Bailey's Sweet	5	Canada Reinette	2

APPLES—*Continued.*

Varieties.	NO.	*Varieties.*	NO.
Porter	2	Andrew's Favourite	2
Jonathan	2	Clark's Orange Pippin	2
Baxter	2	Burbank's Bellflower	2
Perry Russett	2	White Pippin	2
Willow Twig	2	Early Strawberry	2
Walbridge	2	S. Pomme Grise	6
Mere de Menage	2	Spitzenburg	5
William's Favourite	2	Lady Apple	2
Smith's Cider	2	Ontario	12
Marquis of Lorne	2	Beauty	12
Monmouth Pippin	2	Ella	12
Tetofsky	2	Wealthy	2
Ohio Nonpareil	2	Ben. Davis	16
Red Canada	2	Mother	2
Lord Burleigh	2	Pawaukee	2
Clapp's Mammoth	2	Rambo	2
Lady Henniker	2	Lady Sweet	4
Baxter's Red	2	Belbourdoska	1
New Hathornden	2	Clermont	1
Irish Peach	2	Dora	12
Jefferson	2	K. Codlin	2
Flushing Spitzenburg	2	Montreal Crab	1
Chebucto Beauty	2	Hyslop Crab	1
Calkins Pippin	2	Transcendent Crab	1
Cox's Orange Pippin	2	Marengo Crab	1
Lord Derby	2	Van Wyck Crab	1
Bethel	2	Summer Rose	2
Ackerman	2	Stump	1
Omer Pasha	2	Repra	1
Sutton's Early	2	Tetowka	1
Morton's Red	2	Lady Hennicker	1
McIntosh Red	2	Grand Duke Constantine	2
King of Pippins	2	Sutton Beauty	1
Canada Baldwin	2	Ostrowskoe	1
Martha	2	Count Orloff	1
May	2	Grand Sultan	1
Evaline	2	Seymore	1
Peffer's No. 1	2	Menagen	1
Addie	2	Occident	1
Layman's Sweet	2	Palmer Greening	1
Black Detroit	2	Amasia	1
Kingston Seedling	2	Paul's Imp. Crab	1

PEARS.

Tyson	2	Duchesse	1
Sheldon	4	Seckel	1
Beurre de Anjou	6	Duchesse d'Angouleme	2
Grey Doyenne	2	Pitmaston	1
White Doyenne	2	Goodale	6
St. Lawrence	4	Dana's Hovey	2
Mt. Vernon	3	Souvenir du Congres	1
Howell	7	Swan's Orange	4
Winter Nelis	3	Des Moines	1

PEARS—*Continued.*

Varieties.	NO.	*Varieties.*	NO.
Vicar of Wakefield	2	Ounger d'Eté	2
Bartlett	6	Beurre Clairgeau	5
Osband's Summer	2	Beurre Deil	4
Flemish Beauty	6	Josephine de Malines	3
Belle Lucrative	1	Dr. Reeder	5
Summer Frankfort	2	Doyenne Boussock	1
Louise Bonne de Jersey	3	Paradise d'Autumn	1
Beurre Hardy	2	Beurre de Waterloo	1
Nigley	2	Keefr's Hybrid	2
Rostiezer	3	Madeline	2
Clapp's Favourite	1	Beurre Gifford	2
Napoleon	2	Fred Clapp	2
Beurre d'Autumn	5	Urbanist	2
Prince Albert	2	Souvenir d'Espira	2
Manning's Elizabeth	4	Beurre Sanspariel	2
Brandywine	5	Columbia	2
Brockworth Park	3	Renne Langlier	2
Rutter	2	Emele de Heyst	1
Pratt	2		

PLUMS.

Lombard	10	Munroe	2
Diamond	2	Lawrence Favourite	2
Damson	3	Washington	2
Duanes Purple	1	Mill's Seedling	2
Pond's Seedling	4	Yellow Gage	4
Glass Seedling	2	Prince Englebert	2
Columbia	2	Green Gage	2
Goliah	2	Quackenboss	2
Bradshaw	8	Newman	2
H. R. Purple	5	De Carodine	2
M. Laughlan	5	Bryanstone Gage	2
Imperial Gage	2	Prune Agin	2
German Prune	2	Lucomb's Nonsuch	2
Ontario	2	Wild Goose	1

CHERRIES.

Early Richmond	9	Coe's Transparent	2
Black Tartarian	2	Empress Eugene	2
Montmorency	3	Downer's Late Red	2
Late Duke	2	Olivet	2
Knight's Early Black	2	Black Heart	2
English Morello	2	Yellow Spanish	2
Elton	2	Reine Hortense	2
White French	4	Rockport Begarreau	2
Monstreuse de Mezel	2	May Duke	7

The following small fruits are planted in lines between the larger trees in a portion of the orchard :

GOOSEBERRIES.

Smith's Seedling	110	Houghton's Seedling	120
Downing's Seedling	100		

CURRANTS.

Varieties.	NO.	*Varieties.*	NO.
White Grape	50	Red Dutch	25
Cherry	50	Black Naples	100

RASPBERRIES.

Philadelphia	600	Black Caps	12
Cuthbert	350	Gregg	200
Thwack	100	Saunders' No. 53	50
Turner	100	" " 70	20
Herstine	100	" " 72	20
Highland Hardy	100	" " 57	12
Brandywine	100	" " 50	12
Niagara	100	" " 67	5
Clark	50	Caroline	12
Davison's Thornless	100	Mammoth Cluster	150
Dorchester	12		

STRAWBERRIES.

Crescent Seedling	1,600	Maggie	150
Monarch of the West	250	Alpha	150
Triomphe de Gand	250	Mary Fletcher	25
Captain Jack	250	Arnold's Pride	150
Glendale	150	Early Canada	350
Cumberland Triumph	150	Wilson's Albany	800
Nicanor	150	Sharpless	100
Bright Ida	125		

GRAPERY.

The border forming the west boundry of the kitchen garden contains the only vines which we have in bearing order. They were planted six or seven years ago and consist of eighteen varieties, which were popular at that time, and for several years past have produced some good fruit, but last season, although luxuriant in growth of wood and foliage, the late spring followed by cold nights in June and July, kept them so late in a green and growing condition that the fruit was only commencing to colour at the usual time of ripening, so that only a few varieties and a very limited quantity (three or four bushels in all) were fit for use, consisting chiefly of the Delaware, Concord and Lindley. A few sorts viz. : the Adirondac, Iona, and Salem were slightly attacked by mildew, but whether this arose from their location or some other cause, I am not prepared to assert. The adjoining trees on the opposite side of the trellis, by their shade and root growth, now begin to show their effects on this border, and in the course of a few years, will so overshadow the vines that they will be useful only as a dividing line.

Hope centres in the new vineyard, commenced two years ago in a high and airy location in rear of the College building. Four hundred and fifty vines were then planted comprising fifty-five varieties, to which twenty-five distinct sorts were added last year—all of which are now in a promising condition. The first planted will do doubt show some fruit next season, and in each successive year it will be interesting, as well as profitable, to note the distinctive properties and peculiarities of so many sorts side by side,

The subjoined list contains the variety and number of each.

GRAPE VINES.

Varieties.	NO.	*Varieties.*	NO.
Concord	175	Canada	2
Brant	5	Dempsey No. 4	1
Jefferson	1	Prentiss	1

GRAPE VINES—*Continued.*

Varieties.	NO.
Walter	1
Duchess	1
Lady Washington	1
Rochester	1
Una	1
Eva	1
Black Eagle	1
Pearl	1
Beauty	1
Janesville	3
Maxatawney	1
Munroe	1
Croton	1
Telegraph	1
Cuyahoga	2
Elvira	2
Ives Seedling	2
Alvey	2
Hartford Prolific	5
Sugawam	5
Champion	8
Salem	9
Creveling	10
Agawam	10
Moore's Early	23
Wilder	23
Massasiot	23
Clinton	15
Delaware	45
Uhland	2
Montgomery Red	2
Venango	2
Othello	2
Cornacopia	2
Mary Ann	1
Black Hawk	2
Amber Queen	3
Lady	2

Varieties.	NO.
Cottage	3
Verginnes	2
Roger's No. 30	2
" " 41	5
" " 28	2
" " 39	1
" " 2	2
" " 33	1
Pocklington	2
Eumelan	3
Isrella	3
Early Dawn	3
Iona	2
Barry	5
Gaertner	5
Senasqua	5
Merrimac	5
Herbert	5
Brighton	10
Lindley	15
Martha	9
Anluchon	1
Lousiana	1
Echland	1
Noah	1
Hew Haven	1
Green's Golden	1
Norton's Va	1
Cynthiana	1
Maxim	1
Herbemont	1
Drauent's Amber	1
Triumphant	1
Antionette	1
Rulander	1
Concord Chasselas	1
Worden	1

GREENHOUSES.

A few additions have been made during the year to our limited collection of Greenhouse plants ; otherwise few changes have taken place. The stock throughout continues to be in as healthy a condition as can reasonably be expected from their accomodation and surroundings. The system of heating (by flues) is very defective. Some slight alterations and repairs have been made, which I trust will be some improvement, but I am satisfied that no good specimen plants can ever be grown in the present structure, unless some radical change is made. The workshop connected therewith is also in a very delapidated and unsatisfactory state, quite unfit for winter use, and unless replaced at an early date, I fear something more extensive than ordinary repairs will be required.

During the winter months, when time was more plentiful and labour less pressing, a portion of each day was devoted to practical instruction. I cannot here do better than quote from my report of last year, to Professor Brown :

"The various ways of root and top grafting were explained and practised by the students; also, the mode of propagating greenhouse and other plants; the watering, temperature and moisture required; the different systems of heating, and the potting, growing, hybridizing, and selection of plants generally; the composition of desirable soils for potting purposes; the insect pests that usually attack inside plants, with the means of getting and keeping clear of them; also the common and technical names of the plants we have, with the natural orders to which they belong. In all this the students generally manifested considerable interest, and, indeed, passed a very creditable examination at the close of the session; and not a few have so expressed themselves as looking upon these exercises of more real value to the practical man than the more tedious study of systematic Botany or Vegetable Physiology. It seems surprising how little the majority of intelligent young men know of the pot culture and management of plants. In this I believe that many could profitably take lessons from their elder or younger sisters. It is perhaps to be regretted that these practical lessons cannot be carried out to a greater extent into the Kitchen and Flower Gardens, the Orchard, the vineyard, and arboretum. This, however, cannot be done during the spring and summer months, unless more skilled labour is employed. One of the principal difficulties to be contended with in this department is to get the amount of work accomplished by student's labour, with advantage to them and justice to what is required of them—that is, to get the work accomplished in a satisfactory and workmanlike style; and with a growing demand for skilled labour, this want is greatly on the increase."

Jas. Forsyth,
Superintendent.

APPENDIX TO REPORT

OF THE

Commissioner of Agriculture and Arts.

APPENDIX (F).

ANNUAL REPORT OF THE BUREAU OF INDUSTRIES.

BUREAU OF INDUSTRIES.

FIRST ANNUAL REPORT

TO THE

COMMISSIONER OF AGRICULTURE.

SIR,—In presenting the first Annual Report of the Bureau of Industries it is proper that I should, in a few words, indicate the scope and character of its work, and the methods under which that work has been conducted.

Having been established less than a year ago, it was scarcely to be expected that the Bureau could be organized and all the arrangements for attaining its full purpose completed in one short season. The sphere of operations, indeed, may be almost indefinitely widened.

It was necessary to collect information on a great variety of subjects, and from all parts of the Province. This required the aid of numerous agencies, and of a large staff of correspondents. The officers of such local organizations as Agricultural Societies, Municipal Councils, School Boards and Granges were invited to co-operate, and they made a willing response. Many farmers, also, were regular contributors, and instructive reports were made by them from time to time on the state of crops, the progress of farm operations, the results of the harvest, and on agricultural affairs generally.

But the most valuable information was furnished by the people themselves—by the farmers and manufacturers of the country—who filled up the schedules relating to their special interests. The farmer gave the extent of his land, the acreage of his crops, and the number of his flocks and herds; while the manufacturer gave the amount of his capital, the number of his workmen and the wages paid them, and the values of his raw material and manufactured product. Such facts as these, procured at first hand, supply the statistician with the best of all data for results and averages; and, having a large mass of details, he may easily eliminate errors.

The school section was adopted as the unit of agricultural enumeration, and a very important service was rendered by teachers in distributing the schedules to farmers and

making up the sectional returns. Their share of the work (which was purely voluntary) was well done, and the fulness of the agricultural statistics is in a large degree the result of their efforts. A fear was at one time expressed that the female teachers of the Province would be unequal to the task of preparing a table of returns. It was said that they would lack the necessary knowledge of farm subjects. The result proves that there was no ground for the fear. Their reports were neatly, accurately, promptly and cheerfully made.

The statistics supplied by farmers are of the date of 31st May. They embrace the acreage of land occupied and cleared; the acreage under grain and root crops, meadow, orchard and garden; the number and classification of live stock; the wool clip of the year; and the values of land, buildings, stock and implements. The whole were carefully revised and tabulated by townships and counties; but, as the chief interest lies in aggregates, they have been published by counties only.

The products of crops were obtained from returns made by threshers, and from reports of average yield made by correspondents for their several localities, based on actual results.

The counties of the Province have been arranged in the Tables with relation to their locality, for facility in making comparisons; and in addition they have been classified by groups according to their general climatic conditions. The map which accompanies this Report shows at a glance the mode of grouping that has been adopted.

Five special Reports were issued during the year, for the months of May, July, August, September and November. These Reports dealt largely with the progress of farming operations—the effects of weather, and the condition of crops, their harvesting and marketing. They also gave information concerning live stock and improved systems of tillage, and tables of crop and live stock statistics.

These Reports were distributed to correspondents of the Bureau, to members of the Ontario Legislature and the Dominion Parliament, and to all newspapers of the Province. The November Report contained revised Tables of all the agricultural statistics collected during the year. About nine thousand copies of it were distributed in Ontario, and one thousand copies were sent to the Emigration agencies of the Province and the Dominion in England for distribution there.

Returns of the cheese and butter products of factories and creameries, like those of manufactures, were obtained directly from the makers. They are not complete, but they furnish good evidence of the extent to which the dairy industry of the country is carried on.

Every possible assurance has been given, both to farmers and manufacturers, that the returns would be treated as confidential information, and that no individual's interest would be prejudiced by their publication. It is apparent, however, that in Ontario, as in every other country where an attempt has been made to collect industrial statistics, there is a prevailing fear of some ulterior object apart from the public interest. But there is good reason to hope that prejudices will soon disappear, and that here as elsewhere the percentage of returns will steadily increase.

It remains only to add, before entering upon the details of the Report, that the work of collecting information has been greatly facilitated by the action of the Dominion Government in placing the free use of the Post Office at the service of the Bureau.

THE GRAIN CROPS.

The area under grain crops last season, according to returns made to the Bureau, was 5,002,067 acres, being 48 per cent. of all the cleared land in the Province. The detailed statistics of each crop are given by Counties in Tables I. and II., and the average production per acre by Counties and for the whole Province in Table VII.

FALL WHEAT.

From the position which Ontario occupies as a grain growing country it is but natural to expect that wheat should rank, as it does, first in importance among the cereal crops of the Province. In the earlier days of settlement, when the farmer's sources of revenue were comparatively few, there was a steady demand in the world's markets for wheat, and this crop was chiefly relied on for the means with which to pay for land and carry on the ordinary farm operations.

In those days the subject of proper rotation of crops was not forced upon the attention of farmers as it is now; and as the yield continued good, even with indifferent cultivation, the soil was supposed to be almost inexhaustible, and successive crops of wheat were grown on the same land for many years, without rest or manure. But in time the soil, gradually exhausted of the constituents which give food to the wheat plant, began to deteriorate; crops in many cases became a partial or total failure, and farmers were obliged to engage in a more mixed style of husbandry and adopt a more liberal system of manuring and cultivation to ensure success.

This change to a general system of agriculture was hastened by the appearance of the wheat midge, which visited the Province in 1856, and continued to ravage the crops with slight intermission for about twelve years. The loss to the country by the operations of this pest was enormous; in some seasons from one-half to three-fourths of the crop was entirely destroyed, and in 1857 alone it was estimated that the falling off in the yield amounted to not less than 8,000,000 bushels. During the period of this visitation wheat raising was reduced to a minimum, and other branches of farm industry hitherto neglected were adopted in its stead.

Upon the abatement of the midge pest the raising of wheat again became profitable, and it was restored to something like its accustomed place in the economy of the farm. Since the return of good crops there has been a marked yearly increase in the area of land cleared and brought under cultivation, and the acreage sown with wheat has also steadily advanced year by year. Last year about one-sixth of all the cultivated land of the Province was under this staple—1,188,520 acres in fall wheat and 586,817 acres in spring wheat.

The principal fall wheat region of Ontario lies westward of the Laurentian system, the easterly limit being an irregular line drawn from the Thousand Islands, in the St. Lawrence, through the counties of Frontenac, Addington, Hastings, Peterborough, Victoria and Simcoe, to Georgian Bay. In some of the western counties the area of fall wheat last season ran as high as one in every four acres cleared and under cultivation; in others the proportion was about one to eight; while in the counties north of Lake Ontario, and eastward to the Ottawa, it varied widely, being in some sections as low as one in fifty-five.

Fall wheat suffered less during the winter season of 1881-2 than in the severe weather which followed in the month of April and the early part of May. During the cold season, although the fall of snow was everywhere light and afforded little protection, the winter was an exceptionally mild one, and the wheat crop, though constantly exposed, was not endangered by prolonged seasons of severe frost. But with the sunny days of early spring there came frosty nights and dry easterly winds, and the ordeal of alternate thawing in the day and freezing in the night was especially trying. On light soils there was no serious damage done, but on low, undrained and heavy clay lands extensive "heaving" of the wheat plant resulted, and the crop was permanently injured.

Nevertheless, the condition of the crop, after having passed through the winter, was generally promising throughout western Ontario. Comparatively little damage was done by "winter-killing," or spring frosts; some sections entirely escaped, while in others the injury was confined to wheat on wet and low-lying lands. In Lambton the best results were shown on the heavier drained soils, while in Huron and Bruce, on the other hand, the indications on lighter and more sandy lands were the most promising. In the group of counties lying along the shore of Lake Erie the only serious injury from winter and spring frosts was reported from Elgin, Haldimand and Welland. In like manner reports from the central portion of the western peninsula, and from the counties bordering on the Georgian Bay, varied according to soil and situation; but they told a uniform story that the only appreciable injury resulted on loamy and undrained clays. A long season of exposure had given the blade a bleached and withered appearance, but it was hoped that with the great bulk of the crop the root remained unharmed, and that warm weather and genial showers would cause it to spring up afresh. As a consequence very little wheat land was ploughed up and re-sown with spring grain in those districts.

In the eastern half of the Province, and north of Lake Ontario, the prospect was not so encouraging. Much less snow than the average fell during the winter, and in the lake region the extremes of temperature were more marked than in the other parts of the Province. With sudden alternations of sun and frost occurring every few days during winter, the absence of the protection which a copious snow-fall would have ensured did much to weaken the wheat plant, which had already suffered from the long drought in the autumn, leaving it but ill-prepared to withstand the cold dry winds of March and the keen frosts of April nights. In all the Lake Ontario counties, from Lincoln to Prince Edward, with the exception of a few townships remote from the lake front, wheat was greatly injured, particularly on low pieces of ground, or where there was moisture owing to insufficient drainage. As a result many fields were ploughed up, and were sown with barley or other spring grain.

In the East Midland section, which comprises the counties of Victoria, Peterborough, Haliburton and Hastings, fall wheat suffered less from winter exposure and spring frosts than in the other districts. Large portions of this region are comparatively newly cleared, and the shelter afforded by large belts of forest, combined with great diversity of surface configuration, is favourable to the successful wintering of wheat. In nearly every part of this district the crop came out in the spring in good condition, notwithstanding the light covering of snow, and but little damage was done by spring frosts. The acreage, however, was much less than in the westerly counties of the Province, being in the proportion to the cultivated area of 1 to 25.

Very little fall wheat is grown in the extreme easterly section of the Province, in the counties bordering on the St. Lawrence and Ottawa rivers, and the crop, where grown last year, wintered poorly. In many places, especially on low, undrained clay lands, the lack of snow played havoc with the young plants, which were exposed to the frosts and winds of winter and spring. In some cases the entire crop was heaved out by repeated thawings and freezings, and the land was sown with spring grain, covered in with a cultivator and rolled as soon as the state of the ground would allow of working. From one-half to three-fourths of the crop was destroyed in this district.

In the northern districts of Muskoka, Parry Sound and Algoma fall wheat is only grown to a limited extent, and chiefly as an experiment. In the absence of shipping facilities to outside ports, settlers find it safer and more profitable to raise live stock, hay and coarse grains, for which they have a ready market in the lumber camps of their immediate neighbourhood. But wherever the attempt was made to raise wheat it came through the winter safely, and was not injured by spring frosts.

The early weeks of spring were dreary in the extreme. April opened fine and spring-like, but in a few days the temperature fell considerably below the average; there was little rain, a succession of killing frosts, and a steady blow of east winds. This weather continued, with slight change, for a period of five or six weeks. The rainfall for May, however, was above the average, particularly in the western and south-western portions of the Province, where the mean depth for the month, from measurements taken at twenty-four stations, was 3.72 inches; there was also a gratifying rise in the tempera-

ture. Most of the fall wheat in the western counties proved to be well rooted and healthy, and gave promise of recovering in a large measure from its backward condition during the months of spring. In the counties of Grey and Simcoe, on the shore of the Georgian Bay, wheat fields were everywhere well covered with a fine stand of thrifty plants as the season advanced, and the outlook became most promising. In several of the Lake Erie counties the prospect was reported more cheering than for many years, and similar reports, with only occasional modifications, came from all parts of western Ontario. In the eastern portion of the Province the advent of the growing season was even later than in the west, and, as already noticed, fall wheat fields were nearly all ploughed up in the localities worst affected. Those which were left, however, improved rapidly; even the thinnest fields tillered out to an extent which caused farmers to regret having ploughed up what in many cases might have been half a crop, and worth more than the spring grain which was sown in its stead. Reports from the counties of Peel, Prince Edward and Lennox were very discouraging, while in more favoured localities, as in the counties of Ontario, Northumberland, and sections of Lincoln, Wentworth and Halton, the crop gave promise of an abundant yield. Such was the general condition of fall wheat during the growing season.

Throughout the western half of the Province the crop was remarkably heavy at the time of harvesting, but it had not escaped the dangers incident to a late season of ripening. Owing to a rank growth of straw and occasional rain storms, it lodged badly in many localities just as the grain was beginning to harden, and about the same time, unfortunately, it was struck with rust. As a consequence, the sample was found to lack somewhat in plumpness and colour. The worst effects from this cause were reported from the loamy lands of the south-western counties—from Essex, and the basins of the Thames and Sydenham rivers. In some sections in this district the whole crop was reaped and saved in good condition, but the bulk of it was exposed to a rain-storm of several days' duration, and in many fields the grain sprouted. In the Georgian Bay counties a large acreage was saved in good order, and the sample was prime. In the Lake Ontario and St. Lawrence and Ottawa counties what remained of the crop hardly gave an average yield. In the east Midland counties it was quite up to the average, and in the northern districts it was never better. The season, on the whole, was one of surprises —of discouragement at first, followed by much promise, and not without some disappointment at the close.

The actual results of threshing place the yield even higher than was estimated during the growing and harvesting seasons. From a careful compilation of a large number of returns received by the Bureau from threshers and regular correspondents, the yield from the 1,188,520 acres sown is placed at 31,255,202 bushels, or an average production of 26.3 bushels per acre for the Province. The returns from the threshers alone, apart from those correspondents, would have made this average even higher than it is.

In the comparative table given elsewhere it will be seen that in the United States the highest average production of fall wheat for the year, including all the principal wheat growing States, is reported from Kansas, which returned an average yield of nineteen and one-half bushels per acre; the fall wheat average for Ontario is therefore a little more than one-third higher than that of the best American State, and considerably more than one-half greater than the mean average for the States of Ohio, Michigan, Indiana, Illinois, Missouri and Kansas. This comparison is the more satisfactory when it is considered that the bountiful wheat yield has not been confined to Ontario alone, but that large crops have been the rule in nearly all the wheat growing districts on the continent. The yield for the whole of the United States, as given by the Commissioner of Agriculture in his annual report, was thirteen and one-half bushels per acre; and he adds that this is "one and one-half bushels more than the average."

A number of correspondents point out the encouraging fact that the only farms on which wheat withstood the ravages of last winter and spring were those which are managed on improved methods. This is but one more proof of the necessity that exists for the application to practical farming of those aids which science and experience show to be essentially necessary to the profitable and satisfactory tillage of the soil.

Notwithstanding the many instances of careless farming which still meet the eye when travelling in almost any direction in the Province, there is a marked improvement noticeable in the methods of culture, and in the general appearance of farms and stock. This change is doubtless being brought about partly by the necessity which has become imperative for better and different cultivation of the wheat crop. It was perceived by agriculturists that, under the conditions of an over-cropped and exhausted soil, a country denuded of its forest protection, a decreasing snow fall, and a greater number of insect enemies, the primitive style of husbandry common to early settlement would no longer suffice to produce good crops. For many successive years the return was generally below what would have been received from better tillage, and something like system in cropping began to be adopted. The results are quite apparent, and farmers are finding out that the lack of forest protection can be largely counterbalanced by improved cultivation.

The impetus given of late years to the cattle trade has also resulted in more manure being made on the farm, and greater care is being taken in its application. The work of under-draining is progressing slowly, perhaps, yet appreciably, and considerable areas of the finest clay lands, whose only fault is that they are low and wet, are being annually reclaimed and made available for wheat culture. In these various ways the farmers of Ontario are meeting and counteracting the effect of our slowly changing agricultural conditions; they are making liberal use of the advantages secured from the cultivation of land after systematic and approved methods.

SPRING WHEAT.

The principal spring wheat growing districts are in the eastern counties of the Province, and in the district bordering on the shore of Georgian Bay. The proportionate acreage of last year's crop to the cultivated area throughout these districts was as 1 to 12, while in the West Midland counties and in those adjacent to Lakes Erie and Huron the average was only as 1 in 40. In the Erie counties alone the quantity grown was very small, being about 1 acre of every 300 cleared.

During late years the cultivation of spring wheat has not nearly kept pace with that of fall wheat, and in some districts, and particularly in the Lake Erie and Lake Huron regions just referred to, a marked displacement has been going on in favour of the latter. This is owing largely to the fact that, for some cause not yet very clearly understood, there has lately been a steady falling off in the yield of spring wheat, and its cultivation has generally become unprofitable. The main drawback to success in past years has appeared in the form of a "blight," which strikes the grain while it is in the milk, causing the kernels to shrink and lose their normal weight and plumpness. Other enemies, such as the Hessian fly, midge and rust, have also hindered to some extent its full growth and maturity, but these attacks have been mainly local. During last season, however, the crop seems to have suffered more from these than from the blight, and the yield on the whole is somewhat under the average.

The partial failure of a crop which occupies so important a place among the agricultural products of the Province has naturally begun to engage the attention of farmers, and various theories are advanced as to its cause. We speak of "blight," but that conveys no definite meaning; it is a vague term, like "chills," and we use it in a general sense only. The real disease may be of germ or any other origin, and can only become known by scientific investigation. That a poor crop cannot always be attributed to imperfect cultivation is proved by the fact that wheat on the richest and best tilled fields suffers equally with wheat on lands that are worn out and neglected. Nor does it seem reasonable that the blight can be due wholly to climatic causes, though to some extent it may be, and probably is. The theory most generally received is, that the standard varieties which have been in general cultivation for the past thirty or forty years—the Club and the Fife—are deteriorating, and becoming more susceptible to the unfavourable conditions of weather which have prevailed to a greater extent than usual during the past few years, and perhaps also to the attacks of insect pests. Many new kinds of wheat have been originated and tested of late, but none of them have as yet been found worthy of extended cultivation, and until our hybridists suc-

ceed in bringing out a variety more nearly approaching in general excellence to those which have been grown so long, we can hardly expect much improvement in the results. It is possible, however, that the failure is due in some measure to the soil having been robbed of the elements necessary for the growth of spring wheat. The fact that it almost invariably grows and yields well on new land is not without a meaning. Else why does the fall variety thrive where the spring variety has failed?

Spring wheat seeding began in the western peninsula about the 10th of April, and was generally finished on the 25th. In the St. Lawrence and Ottawa districts very little was sown before the 1st of May. Vegetation was very slow for a few weeks after sowing, and the month of May was well advanced before a good braird was visible. The prospect became more favourable as warmer weather and genial showers succeeded the dreary spring season, and in common with vegetation in general the spring wheat made rapid improvement. "Looking well, but late," was the report received from correspondents in all parts of the country, and the crop gave promise of being above the average.

But after the grain came out in head, and as ripening progressed, new elements of danger appeared in many localities. In parts of the counties of Huron and Bruce it suffered severely from local droughts, rust and midge, and independently of these attacks the grain in other localities presented a shrunken appearance—the result of blight. Rust prevailed to a considerable extent in portions of Grey, Simcoe and York, and generally throughout the West Midland and St. Lawrence and Ottawa groups of counties. In the East Midland district heavy rains came in harvest time, following a long dry spell during growth, and the crop, which promised to be the best ever harvested in that district, was seriously damaged.

Altogether there were few localities in the Province in which the spring wheat crop was not affected by one or more of the many contingencies incident to the ripening and harvesting season, and the general yield, both in quality and quantity, was much below what was at one time expected. The production was 9,665,999 bushels, or an average of 16½ bushels per acre. The Lake Ontario, Eastern and Northern districts give the highest averages, varying from 17 to 24 bushels per acre—the latter being the average for 15,028 acres grown in Muskoka and the newer districts to the north.

BARLEY.

The barley crop experienced the full effect of the vicissitudes of the season which prevailed during the period of growth and harvest. The cold weather and frequent rains of May and June were unfavourable to steady growth, and in some places the tender blade was nipped by late summer frosts. As the season advanced, the crop recovered rapidly from the effects of the backward spring; and though in a few districts it came out in head unevenly, and was shorter in the straw than usual, it was generally heavy and had a thrifty appearance.

But the most critical season was yet to come. In the case of barley, more than with any other grain, the importance of having good weather in which to reap and secure the crop is paramount, as the most abundant yield may be seriously depreciated in value by a single shower when the grain is standing ripe on the ground or in the shock. This fact was abundantly illustrated in the experience of last season's harvest. Throughout western Ontario, in particular, the weather during this period was very unfavourable; the crop in various stages of harvesting was exposed for days to frequent showers, with alternations of hot sunshine, and the grain, though of good quality as regards size and plumpness, was generally stained. In the counties along Lakes Huron and Erie the discolouration by wet weather was universal, though the yield was good and the quality otherwise fair. In Grey and Simcoe the crop suffered first from drought and again, just before cutting, from copious rains. In the West Midland counties the sample was dark and inferior from the same cause.

Eastern Ontario escaped the almost continuous rains which rendered harvesting operations so uncertain in the west, and as a rule the barley crop was better saved. In Lennox, Addington and Prince Edward counties, where this grain is so largely grown,

the harvest was favoured by the finest weather, and the crop was reaped and housed in excellent condition. In the counties of York and Ontario, as well as in the St. Lawrence and Ottawa and East Midland districts, about one-half of the crop was discoloured; the balance was a bright sample.

The distribution of the barley area varies considerably in different portions of the Province. The eastern counties give by far the largest acreage. Of the 848,617 acres grown over the whole Province during the past season rather more than one-half, or 461, 678 acres, are found in the Lake Ontario and East Midland groups of counties, and they contain considerably less than one-third of the cultivated area. In these districts 1 acre in every 7 cleared was sown with barley, the West Midland counties coming next with a proportion of 1 to 13. In other districts the average varied, running as low as 4 per cent. of the cleared area in the Lake Erie counties.

There is no very marked contrast in the average yield of the different counties, but the West Midland group take the first place with a fraction over 30 bushels per acre. The average for the Province (28.6 bushels per acre) is very satisfactory for so large an acreage, when the variable nature of the season is taken into account.

OATS.

The area devoted to the cultivation of oats is very evenly distributed over the Province, and varies but little in any section from the average proportion of one acre to every seven and a-half cultivated. The cold weather of spring was less injurious to oats than to other coarse grains, and the crop came up with tolerable regularity, and continued to thrive steadily. As the season advanced, the growth of straw became very rank in districts where rain was abundant, and the injury from rust and "lodging" was considerable, especially on late sown fields.

In the Lake Erie region there was a good growth of straw where the grain was sown early, but owing to rust the crop did not fill out well and was consequently light; besides, the grain shelled badly in reaping and handling. In some parts of the Lake Huron group the drought injured the growing grain, and harvest work was greatly retarded by continuous rains; but on the whole the yield was up to the average. In the Georgian Bay district, on the other hand, the crop was light and below the average, owing to dry weather following a spring season in which the plants had not obtained sufficient strength to withstand the drought. In the West Midland counties, as elsewhere, oats were late in ripening, but the yield was slightly above the average, and the sample was good. Throughout the eastern counties generally the crop was up to the average, very little injury being done to any but the latest fields, which were affected with rust and smut.

During the past season there were in all 1,375,415 acres of oats grown in the Province, giving a total production of 50,097,997 bushels, or an average of 36.4 bushels per acre. A marked increase in production has taken place during the past thirty years.

Threshing and marketing have made considerable progress. The surplus portion of the crop, which the farmer has to spare after supplying his own wants, is mainly consumed within the Province, the lumbering interest alone requiring immense quantities during the winter season. The export of grain and meal forms only a small proportion of the entire crop.

RYE.

Rye is only grown to a limited extent as a crop for the value of the grain, farmers finding it more profitable to raise other grains which give a larger yield and bring a better price. It is found to be of considerable value for grazing and soiling, and the winter variety is largely grown for these objects in many of the older districts of the Province, particularly when the supply of fodder is likely to be short through the failure of clover, or from other causes. No other grain crop approaches it for the abundance of late fall and early spring grazing which it supplies, and on this account it is prized by sheep-raisers as affording the earliest green bite to ewes giving milk. As soon as other pasture comes in the rye is generally allowed to grow up, and it is then either cut for hay or ploughed under for manure.

There has been, however, a considerable increase in the area of rye grown for grain during the last decade, owing no doubt to the large export demand and the consequent improvement in prices. The spring variety is the one most generally grown for this object. For feeding to stock rye meal is held in high esteem by those who have had experience with it, and its fattening properties are undisputed.

Its cultivation is confined pretty much to light sandy districts once covered with pine forests, such land often growing good rye when other crops fail. On this account it is especially valuable as a means of utilizing poor soils which would not otherwise pay for tillage.

Though succeeding fairly well also on richer land, it has come to be regarded as a crop peculiarly adapted to poor or worn-out soils, and in many cases a prejudice exists against its cultivation by the better-class farmer from a fear that it might be regarded as an evidence of his land running down.

Another objection to rye is, that any portion of the seed which happens to be covered a little too deeply fails to germinate, and as the grain will remain in the ground uninjured for years it is liable to spring up in some future season when least wanted, and to mix with the growing crop of wheat or other grain.

About one-sixtieth of the entire cleared acreage of the Province was sown with rye last year, and the average yield per acre was 18.8 bushels.

PEAS.

The pea crop generally was severely checked by the cold and wet weather of May and June. In some cases of early sown peas the seed was chilled, and it perished in the ground before the soil became sufficiently warm to enable it to germinate. With improved weather the crop made a good start, but it was again arrested by the drought which prevailed pretty generally throughout the Province in the month of July; considerable injury also resulted from the ravages of the pea bug.

Owing to the prevalence of the bug in past years, the area sown with peas in the Lake Erie counties has diminished considerably. The bug proved less troublesome last season than usual, however, and the yield was fair; but there was heavy loss by shelling of the grain during harvest—the result of frequent rains. In the Lake Huron district the crop was about an average. In the West Midland and Georgian Bay groups, though the prospect was good during the summer, the effects of a prolonged drought were seen at harvest in a crop deficient both in quality and quantity. In the eastern portion of the Province the dry weather and the bug combined had a baneful influence. Throughout the Muskoka and Northern districts peas was everywhere reported as having been excellent, and the average yield was much higher than in any other portion of the Province. Those districts seem to be admirably suited to the growing of peas, and it is probable that the production will largely increase from year to year. The total area of last season's pea crop in the whole Province was 557,157 acres, and the average yield was 19.6 bushels per acre.

Pea cultivation has been seriously retarded of late by the ravages of the pea bug or weevil above referred to, and heavy loss has resulted to farmers throughout the Province in consequence. It is most troublesome in the southerly counties, along the shores of Lakes Erie and Ontario; in the Lake Huron and Georgian Bay districts it is comparatively unknown. Its operations have greatly depreciated the value of the pea crop for home consumption in the infested localities, and have seriously injured a considerable export trade with Great Britain and the United States. The weevil does not appear to have any parasitical enemies, and no effectual means of exterminating it has been discovered, other than ceasing entirely to grow peas for a year or two, when the bug generally disappears. It is difficult, however, to secure joint action on the part of all the farmers in a given district in a movement of this kind, and any partial adoption of such a means must fail of complete success.

CORN.

The corn crop had much to contend against last season. Owing to the cold and wet weather of May it was planted late, and the ground was in the worst possible condition

to promote its growth. The low temperature of June and the early part of July was scarcely less unfavourable, and many fields had to be replanted. At the end of July the outlook was cheerless in the extreme, and the most sanguine of correspondents in the best corn-growing counties did not look for more than half a crop. But with the month of August the prospect improved. The autumn weather was favourable for ripening, and the bulk of the crop was well matured; still the blighting effects of the earlier season were not wholly overcome. On clay lands the crop was nearly a failure, while on lighter soils it was hardly an average.

The best results are reported from the four western counties of the Lake Erie group, which contain more than one-third of the entire corn area of the Province. In Essex and Kent surprising progress was noticeable in the latter part of the season, and the crop was both well-eared and well-ripened. In the Lake Huron counties corn is very little grown outside of Lambton, while in the Georgian Bay and West Midland groups its cultivation is confined mainly to the varieties adapted for soiling and fodder purposes. In the Lake Ontario and St. Lawrence counties the acreage was not very large in the aggregate, though it seems to be cultivated generally on a small scale. The crop was light and the sample poor, having been caught in an immature state by the fall rains and frosts. In the northern districts, also, the crop in many cases failed to mature.

The cultivation of corn as a general field crop is confined chiefly to the southern portion of the western peninsula—to the counties of Essex, Kent, Elgin and Norfolk. So far as experience has shown, this would appear to be about the limit within which the requirements of a suitable soil and a maximum of heat during the season of vegetation—so necessary to rapid growth and consequently the profitable cultivation of the crop on a large scale—are to be found; and the corn region of the Province is not likely to be extended very much beyond this area under existing meteorological conditions. The crop grown in the Province is not nearly sufficient for home demands, and large quantities are annually imported from the United States for feeding purposes.

The average yield per acre last season was 64.9 bushels in the ear—the highest return being from the Lake Erie counties, where the average was 73.4 bushels per acre.

BUCKWHEAT.

There was a large area under buckwheat in the eastern counties of the Province, towards the lower end of Lake Ontario and between the St Lawrence and Ottawa rivers. It ripened well, and is reported to be the best crop in many years, but some fields were partially destroyed by the gale of September 14th, and others by early frost and wet weather at the reaping season. The largest and best crops in the West were grown in the county of Norfolk.

BEANS.

Field beans are grown mainly in the counties of Kent and Norfolk in the west, and in the counties along the Ottawa river in the east. In the latter district there was an excellent yield, though in some localities injury was done by frost. There was also a good crop in Norfolk, but in Kent it ripened unevenly owing, doubtless, to the excess of August rains.

A COMPARISON OF AVERAGE PRODUCTS.

The total product of each kind of grain, and the average yield per acre, are based on the returns of threshers and the reports of correspondents—the method adopted by the Department of Agriculture at Washington, and by several State Bureaus. In no case are the conclusions arrived at by any haphazard or guess system of computation; on the contrary, they are only given out after the most careful scrutiny and comparison of all the returns and statistical information available. Many instances were reported of wheat fields, for example, yielding forty, forty-five, and even fifty bushels per acre, but these were not used in computing the averages. High figures were carefully avoided.

The following comparative table gives the average product of grain per acre last season for the Province of Ontario, and for eleven of the principal wheat-growing States of the American Union, the figures for the latter being taken from the October report of the United States Department of Agriculture:

——	Fall Wheat	Spring Wheat.	Barley.	Oats.	Rye.
Ontario	26.3	16.5	28.6	36.4	18.8
Ohio	16.7	.....	19.9	28.0	15.8
Michigan	17.8	.....	25.2	33.3	17.0
Indiana	15.7	.....	24.0	27.0	15.1
Illinois	16.0	.....	22.5	37.4	16.6
Missouri	14.6	.....	23-0	34.5	15.5
Kansas	19.5	.....	25.7	38.1	22.3
New York	18.7	.....	25.0	34.2	16.2
Pennsylvania	15.5	.....	23.5	27.8	15.8
Iowa	.....	11.0	21.7	31.8	14.3
Minnesota	.....	13.3	23.3	40.0	18.0
Dakota	.....	16.7	29.2	45.0	20.0

It is only necessary to add that in the United States the grain crops were exceptionally good last year; consequently the figures in the above table may be compared without taking any unfair advantage of our neighbours across the line.

The returns for South Australia for the last nine years, embracing an acreage of wheat about equal to that of Ontario, show an average for that time of only a fraction over eight bushels per acre, the approximate average for last year being placed at 4½ bushels.

New Zealand, a colony whose wheat raising capabilities are very highly spoken of in Great Britain, gives an average for last year, from an acreage only about one-fifth of that of Ontario, of 22.6 bushels per acre.

The comparison of averages, therefore, makes a remarkably good showing for Ontario, and proves that our Province is entitled to rank foremost as a wheat and grain-growing country.

PROGRESS OF GRAIN GROWING.

The following table exhibits by decennial stages the wheat acreage, and the total product of each kind of grain for the Province during the twenty years, 1851-71, and the same for the year 1882. The figures for the former period are compiled from the census returns, and those for last year are from the statistics collected by the Bureau:

—	Wheat.	Wheat.	Barley.	Oats.	Rye.	Peas.	Beans.	Buck-wheat.	Corn.
	Acres.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
1851	798,275	12,682,550	625,452	11,395,467	472,429	3,027,681	18,309	679,635	1,688,805
1861	1,386,366	24,620,425	2,821,962	21,220,874	973,181	9,601,396	49,143	1,248,637	2,256,290
1871	1,365,872	14,233,389	9,461,233	22,138,958	547,609	7,653,545	107,925	585,158	3,148,467
1882	1,775,337	40,921,201	24,284,407	50,097,997	3,549,898	10,943,355	409,910	1,247,943	13,420,984

By this table the grain growing wealth and progress of the Province are unmistakably shown. Unfortunately, however, the wheat crop of 1871 was a failure, the census returns for that year showing an average of only a fraction over ten bushels per acre. As these were the only statistics relating to the wheat yield available for purposes of comparison from 1871 till 1882, it is evident that, to agriculturists in other countries who took the trouble to look into the census returns, Ontario has not appeared so desirable a field for emigration as its actual wheat-growing capabilities prove it to be.

A striking instance is furnished by the French "Bulletin des Halles," an official publication, which recently estimated the wheat crop for the whole of Canada for 1882 at 2,058,000 quarters, or 16,464,000 bushels. Compare this estimate with the actual returns to the Bureau, which show that Ontario alone produced upwards of 40,000,000 bushels of wheat last season, and some idea may be formed of the extent to which the Province has been injured in the eyes of intending agricultural emigrants and capitalists by the exceptional census returns of 1871.

Statements equally misleading have also been made by Mr. Mulhall, of England, a Fellow of the Statistical Society, to which wide publicity has been given. According to Mr. Mulhall the total production of grain in Canada is 130,000,000 bushels, which is 14,000,000 bushels less than the production of Ontario alone last year.

In this view, then, not less than in many others of a more local character, the work which has been undertaken by the Bureau of collecting and publishing correct returns of the season's crops, and of the agricultural and industrial wealth of the Province generally, will be of great value, and must result in bringing our Province to the more favourable notice of a large class of desirable emigrants.

THRESHING AND MARKETING.

In November, when the last returns relating to farm operations were received, much less progress than usual had been made in threshing and marketing the season's crop of grain. This was owing to several causes. Harvesting operations were prolonged much beyond the usual time, and fall seeding was unusually heavy on account of the prevailing drought; but the principal reason was that the lowness of prices offered no inducement to sell. Where part or all of the fall wheat was threshed to make way for spring crops, a good deal of this grain found its way to market early in the season, before there was any serious drop in prices.

The bulk of the barley crop, or at least so much of it as will be sold, has no doubt been marketed, as the best prices are usually obtained in the fall, before the close of the season of navigation. The good quality of the barley grown in the Bay of Quinte region —where it was reaped and housed in fair condition—induced buyers to offer good prices there; but in the western counties, where it was damaged by rains, prices ruled low, and there is reason to believe that a large part of it will be fed at home.

VALUE OF THE GRAIN CROP OF 1882.

Table No. IX. presents the average prices paid during each month of 1882 for grain in the leading markets of the Province. The figures for Toronto give, in addition, the monthly averages for agricultural produce generally, both on the produce market, where sales are only made in large lots, and on the retail or street market, which is wholly supplied by farmers. The average monthly prices for fall and spring wheat, barley, oats and peas are given for the markets of London, Guelph, Brantford, St. Thomas and Lindsay. To get the prices paid for such crops as are grown chiefly in particular sections of the Province, the average quotations are given for one or two local markets in those districts. Thus in the east, from which the bulk of the barley, rye, and peas comes, the figures for the Kingston and Belleville markets are given for barley and peas, and those of the Ottawa market for peas and rye. For corn and beans the averages are compiled from the quotations of the two principal markets in the western peninsula, where these crops are chiefly grown, viz. Ridgetown and Chatham, both of which have shipping facilities by rail, and the latter by water as well. There is also given, besides the average monthly prices of each market for the whole year and for each half year, the general average for the whole Province for the same periods.

The average of prices paid for grain during the past year has been arrived at by taking the mean of all the daily or weekly quotations for each of the markets enumerated. The figures for longer periods than a month have been obtained in each case from a total of all the daily or weekly quotations for that time, for the particular market to which they apply. In preparing the table showing the value of the grain crop of 1882, averages of prices paid in the leading general markets have been taken for wheat, barley, oats, peas, and rye for the last five months, beginning with August ; for beans, from September 1st till the close of the year ; and for corn, for the last three months of the year. On this basis the value of the grain crop of the year is found to be as follows :

GRAIN.	Total Yield, Bushels.	Average Price.	VALUE.
		$	$
Fall Wheat	31,255,202	.971	30,348,801
Spring Wheat	9,665,999	1.019	9,849,653
Barley	24,284,407	.638	15,493,452
Oats	50,097,997	.42	21,041,159
Rye	3,549,898	.623	2,211,586
Peas	10,943,355	.726	7,944,876
Corn	13,420,984	.50	6,710,492
Beans	409,910	1.55	635,360
	143,627,752		$94,235,379

This gives an average of $49 per head for the whole population of the Province as the value of the leading grain crops of 1882.

LIVE STOCK.

It is gratifying to observe that of late years the outlook for the live stock interest—at all times an important part of our agricultural system—has so improved as to entitle it to increasing attention from our farmers. The change is brought about largely by a greater demand, consequent upon the opening up of new markets, for the surplus stock of the country. This applies especially to horses, cattle and sheep, all of which now find ready sale at remunerative prices, and the supply of suitable animals is short of the demand. The importance of this improved condition of the live stock trade can hardly be over-estimated, since it admits of the more general adoption, with profit, of a very desirable branch of husbandry, and one that is only as yet partially developed. Any extension of the business of breeding and raising neat stock and horses adds to the farmer's resources, makes it possible for him to introduce a greater area of clover and root crops into his rotation, enables him to consume at home more of the produce raised on the farm, and, by making more and better manure, to keep his land in a higher state of productiveness. [The statistics of live stock are given in tables III. and IV. They show that the total number of horses in Ontario is 503,604 ; grade and native cattle, 1,562,683 ; of thoroughbred cattle, 23,629 ; of sheep, 1,915,303, and pigs, 850,226.]

HORSES.

Horse breeding has been stimulated considerably by a revival of the export trade with the United States, and by the extensive market that has sprung up within the past

few years in Manitoba and the North-West, for which Ontario furnishes the chief supply. Experience has shown that the soil and climate of Ontario are peculiarly adapted for raising good horses. The growth of the young animal is not so rapid that bone, muscle, and constitution are sacrificed to size and early maturity. Good food and water are abundant, the climate is invigorating, and daily contact with his future master from colthood renders him tractable and free from vice. In the Eastern States, where the supply of home-bred horses is not nearly sufficient to meet the demand, Canadian animals are much preferred over those reared in the West, being superior in form, bone, vigour of constitution, and consequent freedom from disease. Good roadsters and draught horses of Canadian breeding are eagerly sought after and command high prices in the markets of New York, Philadelphia and Boston. In Manitoba they are also in good demand, being found superior to those brought from the plains to the south. None but the best animals—sound, well broken young horses of medium weights—are sent to the North-West market, and they bring good prices there.

The standard of excellence attained by Canadian horses is due in no small degree to the care and enterprise that have been displayed in selection and breeding ; and several distinct families of Province-bred horses have been founded, with valuable characteristics which they are capable of transmitting if bred judiciously. Importations are made by horse raisers, from time to time, of the best animals in the various classes procurable in Great Britain and France, with which to maintain and improve the quality of their stock.

During the early part of last season "pink-eye" prevailed to a considerable extent among horses, especially in the eastern part of the Province, and in the lumbering districts of the north. In some sections many horses died of the disease, and lumbering operations were delayed considerably. A common effect on brood mares was to cause them to lose their foals. With this exception, horses were in a healthy condition throughout the year.

CATTLE.

The success of the experiment of shipping fat cattle and sheep across the Atlantic has resulted in opening the best markets of Great Britain to the competition of Canadian beef producers, and many thousand head of our choicest animals are annually exported with safety and profit. At first the experiment was tried of shipping dead meat in a frozen state, but this plan was found to be impracticable, and is now only continued on a limited scale. Vessels were fitted up specially for the purpose of transporting the animals alive, and the appliances were improved from time to time as experience suggested, till now a ship load of cattle can be taken across on an ordinary voyage with comparatively small risk or loss.

In 1881 there were 70,000 head of cattle, and about the same number of sheep, shipped from Canada to Great Britain, and the great bulk of these went from Ontario. To properly meet this trade first-class animals are required, the preference being given, in cattle, to steers of three or four years old—grades of some improved breed, well fattened, and of a form that will dress the largest percentage of meat of the best quality. Dealers find no profit in shipping ordinary native cattle ; for, no matter how well fed they may have been, there is in them a much larger proportion of offal than in the improved animal, the quality of the beef ranks low in the British market, and the carcass is deficient in cutting up value. Owing to the existence of cattle disease in the western States American cattle have to be slaughtered on landing at a British port, but Canadian cattle can be shipped forward to their ultimate destination without detention beyond the customary examination in quarantine.

The business of breeding and feeding suitable cattle for the English market is one to which Canadian farmers can hardly give too much attention. Although only in its infancy as yet, it has attained to large proportions, and promises to maintain a steady demand for all the marketable animals that can be supplied for some time to come. The Ontario stock raiser can hardly hope to have a monopoly of this supply. The opening up of immense feeding grounds on the Western and North-western prairies offer him keen competition, with his high priced land and limited acreage, and it is only by adopting the most improved methods that he will be able to retain a share of this valuable trade.

Exporters to Britain require a better class of cattle than our home markets have hitherto been content with. Large discriminations are made in favour of prime beasts, giving the greatest amount of beef and the least waste, for only these will pay a profit to the shipper. Those of our stock raisers who are most successful have brought up the quality of their cattle by crossing native cows with a pure-bred bull—usually Shorthorn, Hereford, or Poll. If the male is of pure blood, the result of even the first cross will show a marked improvement in all the characteristics desirable in an animal for the shambles. Grades of either of the above mentioned breeds will consume less food, attain to a greater weight at an earlier age, and command a higher price, than the best animals of native descent.

The question of a more liberal and judicious system of feeding is only secondary to that of improving the breed. It is sometimes said, by the unprogressive portion of the farming community, that "the breed is in the mouth;" but however untrue it is that the most lavish feeding will produce a first-class animal where blood is lacking, it *is* true that all efforts to improve the breed by the introduction of better blood are comparatively lost unless accompanied by regular and liberal feeding and care from the earliest stage of the animal's growth. Our farmers can no longer afford to raise scrub cattle and starve them through life, at a loss to themselves, and possibly also to the dealer who handles them afterward; and the improvement of the stock of the country by the introduction of blood that will give rapid growth and early maturity, combined with expert feeding to secure these results, must be the basis of success in future beef raising.

It is interesting and gratifying to mark the progress which our best farmers are making in the improvement of their native stock by introducing blood of the best breeds. There are districts in the Province, well known to cattle dealers, where, owing to the educating example of one or two enterprising pioneers, improved stock has been the rule on almost every farm for many years; but farmers in many other localities where there have been few, if any, attempts at improvement hitherto, are awaking to the importance of the subject. A larger number are beginning to see that it is a penny-wise policy to breed from scrub males, and they are either buying young bulls of pure blood from reliable breeders, or they are making a more liberal use of those which may be available in the neighbourhood. In many townships the local Agricultural Society acts as the pioneer of stock improvement, by purchasing one or more pure-bred males and placing their services within reach of all at a moderate charge. In this connection, too, the results of the feeding experiments conducted annually at the Ontario Agricultural College have been of great value, as showing the relative merits of the different breeds for the stall, and showing, also, what may be done in beef-producing under proper conditions. A considerable trade in dressed beef is carried on with Manitoba, and shipments from Toronto alone generally average from two to three cars daily. This business, however, can only be expected to last until supplies begin to come in from the settlers, and from the stock ranches in the far west.

In the work of grading up our native cattle and keeping them at the standard necessary to secure the best results, we are constantly under obligations to the breeders of pedigree stock for bulls of good form and pure blood, and capable of transmitting to their offspring a large measure of the particular characteristics of their breed. The business of importing and breeding high-bred, or "fancy" cattle, as they are often termed, is an important one in the Province, and one in which there is a large amount of capital invested. The earliest importations of thoroughbred cattle were of the Durham, or Shorthorn breed, and were made a few years prior to 1840. Progress at first was slow; few were found with the taste or the means to embark in such an expensive enterprise, and for nearly twenty years the number of Shorthorn herds in the Province remained very small indeed. As importations from Great Britain were made from time to time, and the stock quickly accommodated itself to its new conditions, it became apparent that the Canadian climate was eminently fitted to impart constitution and quality to the Shorthorn. In later years the Americans came to recognize this advantage enjoyed by Canada as an acclimatizing ground for imported stock, and a remunerative trade sprang up with Western breeders for all the surplus animals of good breeding that we could supply. By degrees other breeds were introduced, and the Devon, Galloway, Hereford,

Ayrshire, and more recently the Aberdeen Poll, have proved no mean rivals to the lordly Shorthorn for public favour. At present the Shorthorn, Hereford and Polled Aberdeen and their grades stand in the front rank, and divide the honours pretty equally as cattle for the butcher. The Ayrshire is prized chiefly for its milking qualities, and Jerseys are bred to a limited extent for the butter dairy. There are many strains, however, of the three breeds first mentioned that exhibit good milking properties, as well as a disposition to lay on fat quickly. Galloways and Devons, too, have their advocates, and they are justly prized for their excellent feeding qualities and general profitableness under certain conditions. The farmer who wishes to improve his native stock proceeds by crossing them with a carefully bred male from some one of the above mentioned families of cattle, and not until he has learned the absolute necessity of using none but pure bred sires for the first and all succeeding crosses can he hope to attain any measure of permanent success.

SHEEP.

Sheep breeding, as already stated, has also found in the export trade with Great Britain a new and profitable outlet for surplus fat stock. There are no extensive sheep farms in the Province, but each farmer generally keeps a flock ranging in number from twenty to one hundred head. The climate is admirably adapted for sheep raising and wool growing, and disease is almost unknown.

For many years the long wool breeds—Leicester, Lincoln, and Cotswold—were held in almost universal favour as giving the greatest return in quantity of wool and weight of carcass, but recently the demand for a finer grade of wool and a better quality of mutton, has brought the Downs more prominently into notice. Hampshire, Shropshire, Oxford and Southdown rams are now more freely used in crossing on the coarse native or blooded stock, and they at once improve the grain and flavour of the mutton, give a fleece of finer texture, and impart other desirable feeding and early maturing qualities.

A large trade in lambs has also been carried on with the Eastern States for many years; but for the English market good yearling or two-year wethers, carrying a fair proportion of flesh with fat, are the most saleable.

In past years breeders of pure blooded sheep have imported largely of the various breeds from England, and have carried on a remunerative business in supplying American sheep-raisers with stock with which to improve and maintain the quality of their flocks. Western sheep men do not hesitate to declare that the Canadian climate gives constitution to the imported animal and adds lustre and weight to the fleece, and they have adopted the practice largely of coming to Ontario for their breeding stock in preference to importing direct.

The indications of the market for wool and mutton, present and future, promise the greatest profit from medium animals, such as are obtained from an infusion of Down blood on heavier stock. Merinos are practically unknown in the Province.

The returns of the wool clip for 1882 by counties are given in Table V., from which it appears that the total clip was 5,746,185 lbs, of which 4,842,078 lbs were coarse wool, and 904,107 lbs were fine wool. The average weight per fleece was a fraction over five pounds.

HOGS.

Swine-raising is not extensively followed in any part of Ontario, and farmers seldom have more than a few hogs to s ll after supplying the demands of the family. Exceptions to this rule, if any, are found in the corn region of the western peninsula, and in the neighbourhood of mills and cheese factories, where hogs are sometimes raised and fattened on a larger scale. Prices of pork fluctuate considerably, and are often so low that they will not more than pay for the cost of the grain consumed in fattening. At the value to Ontario farmers of their peas and barley they cannot hope to compete successfully, on any extended scale, with the great hog and corn producing States of the West.

Ontario pork is nearly always slaughtered on the farm, a practice to which dealers are very much opposed because it materially diminishes the value of the carcass by the

time it reaches the packing house. Large numbers of western hogs are annually imported and slaughtered in bond for export in a cured state.

With swine, as with cattle and sheep, western hog raisers have depended largely on Ontario breeders of fancy stock for the blood to improve their herds, and have bought large numbers of pure-bred Berkshires for this purpose. This breed has become the general favourite, although Yorkshires, Suffolks and the Essex are also bred in considerable numbers.

POULTRY AND EGGS.

A large and growing trade is carried on in poultry and eggs with Great Britain and the United States. In the fall of each year Canadian turkeys are eagerly bought up and shipped in a frozen state to the English markets, where they bring good prices. The export trade in eggs is carried on chiefly with New York and other American cities. Some idea of the rapid expansion of this business may be gathered from a comparison of the Trade returns (Table No. X.), which show that in 1871 Ontario exported 2,217,579 dozen of eggs, valued at $259,766, and that the trade had grown year by year till in 1881 there were exported 5,729,847 dozen, valued at $696,554.

IMPROVED BREEDS OF LIVE STOCK.

During the season of 1882, and after the date on which the returns of live stock were collected by the Bureau, I have ascertained through the courtesy of Dr. McEachren that there arrived at Canadian ports from Great Britain, for Ontario breeders alone, 287 head of cattle of various breeds, 878 sheep, and 19 hogs. During the same period there were imported into Canada from Europe 260 horses, and a large proportion of this number may safely be put down to Ontario. These returns will convey some idea of the extent to which thoroughbred stock is imported from Great Britain to this Province.

The figures giving the totals of thoroughbred cattle are based on the schedules filled in by farmers, giving the numbers in their respective herds. To obtain correct returns on this head is probably as difficult a task as any coming within the scope of the Bureau, from the fact that some farmers, owing to a misconception of what constitutes a pure-bred animal, are apt to return their high grades as thoroughbred. The aim of the Bureau was to ascertain the number of cattle in the Province entitled to Herd Book registry; but it is well known that there are many pure-bred animals in the country that are never registered, and in making returns of these owners may be trusted to make a classification that is in the main correct; they are, at any rate, in the best possible position to know the facts. As corroborative of the figures given in Table No. IV., it may be stated that there have been registered for Ontario farmers in the Canada and British American Herd Books since 1875 not less than 14,000 of Shorthorns alone, and some of the largest breeders in the Province do not register in either of these books. Where no thoroughbreds were returned, no estimate was made to supply a possible defect or error in the report.

THE MEAT SUPPLY.

With the exception of three or four counties in the Lake Erie and Georgian Bay districts, where local droughts prevailed, pastures were fresh and rich throughout the season, and live stock was healthy and in fair flesh. At the time of the last returns cattle and hogs intended for fattening were being taken up and given extra attention. The steady drain of cattle for export purposes, which has been going on for years past, has led many farmers to sell themselves short, and in some districts there is a scarcity of matured animals for stall feeding. Hogs were generally reported scarce. A fair surplus of sheep and lambs is held in the inland counties, but in the Lake Erie and St. Lawrence counties drovers buying for the American markets always keep the supply low.

THE ROOT CROPS.

The only root crop that is universally cultivated in the Province is potatoes, of which a sufficient quantity is raised for home use, and some for export. Turnips, mangolds, and carrots are grown pretty generally in some sections, and in others to a limited extent only, their use being confined to the better class of farmers, who know their value as winter feed for stock.

POTATOES, TURNIPS, MANGOLDS, AND CARROTS.

During the first few weeks of root growth potatoes made a fair start, and as soon as the plants came up they were attacked by their old enemy, the bug, which promised to be as troublesome as ever. The weather was very dry throughout the sowing season, and great difficulty was experienced in securing a good braird of turnips and other roots. The fly also did much damage, not only to the young turnip plants, but to mangolds as well ; and from this cause and the dry weather combined many root fields were ploughed up or resown.

As the season advanced the effects of local droughts were felt in many localities ; potatoes, especially the earlier varieties, gave poor promise of a crop, and other roots made very slow progress. But the heavy rains of August improved the prospect rapidly, so far as later root crops were concerned, and with the advent of cool nights and occasional showers, carrots, mangolds and turnips took root and grew vigorously.

With the abundant rains a new danger threatened the potato crop from the appearance of rot, especially on heavy or wet soils ; but with dry weather succeeding the disease was checked and very little injury was sustained.

Under a favourable fall season root crops of all kinds continued to grow rapidly, and when the time came to take them up the yield of turnips, mangolds and later potatoes was such as to satisfy the most sanguine expectations of the husbandman. This was especially the case in all the cattle feeding counties of western Ontario. Turnips were not, perhaps, quite as large as usual, but the crop was more even, and the yield was fully as great.

The potato beetle was everywhere present in large numbers, and the utmost vigilance was required to preserve the crop. Where the application of Paris green was systematically followed the potatoes were saved, but where hand picking was depended upon there was generally heavy loss.

THE USES OF ROOT CROPS.

Turnips are fed to store and fattening cattle and sheep generally ; mangolds are particularly adapted for feeding to milch cows in the spring, and carrots are fed chiefly to horses.

That the area of land devoted to the cultivation of these roots might be very much enlarged with profit, there is little reason to doubt. As a cleaning crop for weedy fields nothing can equal roots, and they afford an excellent opportunity for the application and incorporation into the soil of needed manures without risk of injuring the crops.

The more general use of roots in winter feeding would be of great advantage ; stock would be healthier, and the growth of young animals would not be checked, as is the case when they are suddenly transported from green and succulent pastures to a diet composed wholly of dry food.

It is hoped that, with the increased interest taken in stock raising and dairying, root cultivation will also receive a larger share of the attention which it justly deserves.

In Table II. will be found statistics of the acreage and produce of potatoes, mangolds, carrots and turnips, given by counties, with the totals for the Province, and in Table VIII. the average yield per acre by counties.

HAY AND CLOVER.

Clover fields were severely injured by winter exposure, and by the late frosts which prevailed in nearly all sections of Ontario in the spring of 1882. In several localities the crop on wet clay soils was heaved out to such an extent as to render it worthless for hay or pasture, and many fields were ploughed up in consequence. In some of the lower districts, where the frosts were unusually severe, the young timothy was nipped in the blade after vegetation had commenced, and its growth was seriously retarded. The spring season was very backward; there was little growing weather throughout May, and it was near the close of the month before the meadows got a start. Throughout June they continued to make fair progress; the haying season, too, was much later than usual, and this gave the crop a chance to fill out and attain to greater weight than if farmers had been compelled to cut it at the usual time.

The month of July was very favourable for hay-making, the weather being steady, with a moderate temperature, and the bulk of the crop was saved in good order before the heavy harvest rains came. Clover recovered only partially from the serious injury sustained during winter and spring, and in the most favoured localities the yield did not exceed one ton per acre. Timothy and mixed grasses were very heavy, and no better crop has been gathered in twenty years.

Owing to the extensive heaving of the plants already referred to, the crop of clover seed was much below the average. Very few fields were left for seed, and where the crop was cut and threshed the sample was shrunken and inferior. The second crop for hay was very short from the same cause. Second crop clover was injured to a considerable extent by a blight which appeared in many sections, injuring the leaf and blossom. This blight seemed to prevail most in those districts that had been visited by the apple blight. The crop left for seed was further injured by the clover midge, a comparatively new insect enemy, which works in the blossom and destroys the seed. Timothy, where saved for seed, was a good crop all over the country, and there was a plentiful yield of seed of good quality.

FRUIT CULTURE.

While agriculture in its various branches is making steady progress increased attention is also being paid to fruit-raising, and it is fast becoming an important interest in the Province. In fact the present dimensions of the fruit trade, bringing into the country as it does an annual income of several hundred thousand dollars, entitle it to no mean place alongside our agricultural industries. The climate of Ontario, modified by promixity to the great lakes, is adapted to the cultivation of almost all fruits common to the temperate zone; the utmost diversity of soil and situation afford abundant opportunity for the growth of the different varieties, and there is an unlimited market for all the fruit we can supply. All the hardy fruits can be grown to perfection in any part of the Province, but there are certain districts where the climatic conditions are more favourable to the growth of the less robust varieties. These include, in western Ontario, the Niagara district and the counties westward skirting Lake Erie, a strip of country on the Lake Huron shore, and the Georgian Bay region, centreing around Owen Sound and Meaford; and, in eastern Ontario, the Bay of Quinté district.

APPLES.

The staple fruit of Ontario is the apple, of which large quantities are usually grown in excess of home demands. It is now an undisputed fact that with our short, clear, warm summers, we produce the best apples in the world. As proof of this, our apples rank A1 in the English markets, and are preferred to home-grown fruit in the large centres of consumption. The American apple, and those raised in Europe, are the product of a longer season and slower growth, and the fruit lacks the high colour, crispness and flavour that are found in the Canadian apple. Winter varieties of good keeping qualities are those principally shipped abroad, and several hundred thousand barrels

are annually exported to Great Britain. Each farm, with few exceptions, has an apple orchard, the size varying from three to twenty acres, but in some of the more favoured fruit growing districts the business is carried on much more extensively by individuals or companies, who make it a specialty. Some idea of the rapid expansion of the export trade in fruit may be had from an examination of the Trade Returns, which show that the value of green fruits exported from Ontario and Quebec has steadily increased year by year from $23,634, in 1868-9, to $514,406, in 1880-1. It is impossible from those returns to say how much of this export went from each Province, but it is safe to say that a very large proportion was the produce of Ontario. Apples form the great bulk of the green fruit exported.

For many years past the principal obstruction to apple culture has been the codling moth, an insect that deposits in the young fruit an egg which hatches out into a destructive larva. Apples infested with this pest are known as "wormy," and their value is very much detracted from. Not only is the interior of the apple spoiled by the operations of the worm, but the fruit ripens before it has attained its full size, colour and flavour, and falls to the ground. Thousands of dollars are annually lost to the country through the ravages of this worm. A study of the insect's habits, however, has enabled intelligent fruit growers to keep it in check very successfully, and in the leading fruit growing districts it is not now considered so formidable an enemy as when it first appeared. Where there is combined action among apple-growers in destroying infested fruit and trapping the larva as it seeks for a hiding-place in which to change into the chrysalis state, the fruit is tolerably free from attack; but if allowed to escape and multiply, it becomes very destructive. Caterpillars, lice, and borers are more or less troublesome, but their attacks are generally local, and with a little vigilance they may be successfully overcome.

PEARS.

The cultivation of the pear is confined principally to the more favoured fruit districts of the Province. Trees of the improved varieties require more care, are shorter lived, and there is less certainty of profit than from the apple, so that for these reasons the farmer prefers the latter for general cultivation. A few pear trees will be found in almost every orchard or garden, but they do little more than supply the family demand. Professional growers raise considerable quantities of pears of excellent quality and flavour, and a ready home market is found for all that are produced. Owing to the difficulty in growing the pear, and its poor carrying qualities as compared with the apple, it is not likely that it will ever be generally cultivated to any great extent.

Ontario pear-growers, in common with those all over the continent, have for many years suffered heavy losses from pear blight, a disease of which, so far, all attempts to discover either the cause or a remedy have been unsuccessful. Many thousands of trees have been lost from blight; many others survive its attacks, but the recovery is slow and fruit-bearing is seriously impaired. The pear has also a few insect enemies, notably the pear slug, which attacks the leaves, but none of them are very formidable

PLUMS.

Plum cultivation is pretty generally engaged in all over the Province to a moderate extent. The best districts are in Prince Edward County and in the Owen Sound region; the latter is popularly known as the plum garden of Ontario. From this district large quantities of plums are annually shipped to Chicago by water, and they command remunerative prices. The great insect enemy of the plum is the curculio, and constant vigilance has to be exercised to save the crop in districts infested by this pest. Plum trees are also subject to a disease known as "black knot," a woody excrescence which forms on the branches and causes the death of the tree. Indeed the spread of this disease was so rapid a few years ago that the Legislature passed an Act making it obligatory to cut down and burn all trees or branches affected with it. The plum district of Owen Sound has so far enjoyed tolerable immunity from these evils, and good crops have been the rule.

CHERRIES.

The cherry is generally grown to an extent sufficient for household wants. It is the first of the fruit trees to give ripe fruit in the summer; and this fact, added to its unrivalled qualities for culinary purposes, secures for it a ready market. Cherries are imported in considerable quantities during the season from the United States. The common red cherry is the kind most generally grown, and, under the custom which is very often adopted of allowing the tree to shift for itself, it is found to succeed the best. The large improved varieties, however, are gradually coming into cultivation, and the market is being supplied with a better quality of fruit. Cherry growers suffer from the depredations of birds, and from several insect enemies; the black knot, too, sometimes attacks the trees, especially those of the old common variety.

PEACHES.

Peaches are successfully grown within a limited area in the milder parts of Ontario. The supply is not sufficient for home demands, and we import largely from the States. Of late years Canadian peach orchardists, in common with those of the neighbouring States, have suffered heavy loss from the "yellows," a disease which attacks the fruit and impairs its quality.

GRAPES AND SMALL FRUITS.

Grape culture succeeds fairly in all parts of Ontario with the hardier varieties, and it is carried on quite extensively in the south-western part of the Province for the sale of the fruit and for the manufacture of wine. Large vineyards are cultivated in the counties of Wentworth, Lincoln, Welland, Kent and Essex, and few fruit crops yield as certain a return, or give as small a percentage of failures as the grape. It is known that Ontario, geographically, is within the latitude of the vine-growing countries of Europe, and experience is proving that under the ameliorating influence of our great lake system grape-growing can be engaged in profitably on a large scale. This industry is growing steadily, and promises within a few years to attain to considerable importance.

Small fruits, such as strawberries, currants, raspberries and gooseberries, are everywhere grown in abundance for home consumption, and to supply the demand in cities and towns.

THE FRUIT CROP OF 1882.

Generally speaking, the fruit crop of 1882 was a failure. In the spring there was an abundance of bloom, but cold rains, east winds, and local frosts had a blighting effect. In all the western counties apple trees were struck early in the season with a blight which withered the foliage, and in many cases destroyed the tree outright. Wherever it prevailed the apple crop was very poor. Various causes were assigned for this unusual visitation, but the opinion was general that it was only temporary in its character. In the eastern counties the apple crop escaped the blight that proved so destructive in the west, and the yield was up to the average. The codling moth was everywhere more troublesome than usual. Plum and cherry blossoms were generally severely injured by spring frosts, and shipments of plums from the Owen Sound and other plum districts were light in consequence. The curculio, also, injured the plum crop severely in the southern parts of Ontario. Peaches were a light crop, owing chiefly to injury by an ice-storm in winter and by spring frosts during the blooming season. Pears were an average crop, and grapes and small fruits were generally abundant and ripened well. Apples and pears were the only large fruits of which there was a surplus.

By a reference to Table No. V. it will be seen that the total area of orchard and garden in Ontario is 213,846 acres, and of vineyard 2,098 acres. The area devoted to the cultivation of fruit bears, therefore, a proportion to the total cleared acreage of about one in fifty.

THE NEW CROP OF FALL WHEAT.

The large yield of fall wheat in 1882 naturally enough induced farmers to sow an increased acreage of the same crop last fall, in the hope of equal good fortune during the present year. The additional area sown is, of course, greater in those counties where last year's yield exceeded the average; in sections where the average only was reached, little, if any, increase is perceptible; while in counties where last year's return fell below that in the rest of the Province, even less than last year's acreage is reported. From the returns to the Bureau it would appear, however, that, taking the Province as a whole, the area is considerably greater than that sown in the fall of 1881.

Certain causes prevented the increase from being larger than it really was. The ground in all but the St. Lawrence and Ottawa counties, owing to the heavy rains during harvest, and the subsequent baking it received from the hot suns of the end of September and early part of October, was in anything but good condition for ploughing and harrowing, and much more than the usual work and trouble were required to fit it for the reception of the seed. This was especially the case on stubble, pea and barley lands; summer fallows were much more easily worked. In the eastern part of the Province, as has been said, no such difficulty was experienced. But the lateness of the harvest, and the consequently shortened period for preparing the ground and sowing the grain, contributed to keep the area sown within smaller limits.

In Grey and Simcoe, where the average yield per acre exceeded thirty bushels, the increase, as might have been expected, is very decided; so much so that it is to be feared considerable wheat was sown on ground which, owing to indifferent manuring and preparation, was but imperfectly suited to a crop requiring so much care in cultivation.

In the Lake Erie counties, again, where the yield, though good, was below the average for the Province last year, and where a considerable portion of the land is low-lying and heavy, and consequently specially difficult to work, there has been a slight decrease in the acreage sown.

In the East Midland, West Midland, and Lake Ontario counties there has been an increase, while in the Lake Huron and St. Lawrence and Ottawa counties the breadth of last year's sowing is about the same as that of the year before. The last mentioned group, however, grows but little winter wheat at any time.

The appearance and condition of the new crop, taking all the circumstances into consideration, are on the whole good, though, owing to the lateness at which seeding was begun, the refractory state of the soil at that time, and the want of stimulating rains, the plants at the date of the last returns to the Bureau were neither so strong nor so well advanced as is usual at that time of the year. The crop was also patchy and uneven on wet or improperly drained lands.

Little damage appears to have been done by the Hessian fly, though slight mention is made of the pest from most parts of the Province. The attacks of this insect are not easily observed in the autumn; hence it is difficult to tell how much injury has really been done. Perhaps the fact that the sowing of fall wheat was unusually delayed may prove of benefit in warding off to some extent the ravages of this insect, as the roots of the plant may not in all cases have been sufficiently advanced for the attacks of the larvæ before winter closed in.

The wire-worm and white grub have also been noticed, but it is not likely that their depredations have been more than usually extensive.

MANURES AND ARTIFICIAL FERTILIZERS.

The great means upon which the farmers of Ontario depend to maintain and increase the productiveness of their lands is undoubtedly barn-yard manure. Other fertilizers cost money, are in places difficult to get, and sometimes the farmer sees no immediate return when he applies them to the soil; but the manure heap is a necessary feature in every barn-yard, is always at hand, involves no direct or apparent outlay, and a belief in its valuable effects is an article of faith with every farmer.

Increasing care and attention are being paid to the preservation and preparation of farm manure, but there is still room for improvement in this respect. There are many farmers who allow their heaps to be subjected to continual drenching by rain, which carries off the soluble and most valuable of the fertilizing agents, or who do not apply their manure with sufficient reference to the nature and capability of the soil or the kind of crops to be grown.

The principal artificial fertilizers used in the Province are salt, gypsum or land plaster, and mineral phosphates, and are probably employed as to quantity in the order named. An essential element in the use of fertilizers, as in other things, is cost; and as these articles are more or less bulky, and the charges for freight a considerable item in their price, their use varies a good deal with the distance from the place of production.

The wells in the Huron district furnish most of the salt used for fertilizing purposes in Ontario, while gypsum is found on the Grand River from Paris to Cayuga, and phosphates in the eastern sections of the Province.

The reports to the Bureau do not by any means agree with regard to the results obtained from the use of any one of these fertilizers. Some farmers claim, for instance, that they have received no benefit from the application of salt, and say that they have discontinued its use without experiencing any corresponding loss. The weight of evidence adduced, however, is decidedly in favour of salt as a fertilizer. While it is not so clear that its use greatly increases the yield of grain, there can be no doubt that it has the effect of stiffening the straw and brightening the sample, as well as of protecting the crop from rust and producing an earlier ripening season. It is used mainly on fall and spring wheat, barley and roots. Complaints come from some sections of a rise in the price of salt per ton, the consequence of which would seem to be to lessen the use of this fertilizer.

Plaster is applied principally to clover, roots, and also to corn and other cereals. Its effects upon the first mentioned crops are admitted on all hands to be good, and on light loamy soils considerable quantities are used with advantage. In certain localities, however, plaster would appear to be losing some of the popularity it formerly enjoyed.

Mineral phosphate is being used at present, chiefly by way of experiment, and does not seem to be generally regarded as a fertilizer whose merits and value had been thoroughly ascertained. Some of those who have applied it—on fall wheat, spring crops and turnips—speak highly of its effects; others say its use has been rarely satisfactory. Its action doubtless varies with differing soils. Bone superphosphate is also employed, but only to a limited extent.

A favourite and highly beneficial method of renewing worn out lands, or replenishing lean soils, is the ploughing under of green crops.

DRAINAGE OF FARM LANDS.

There is little necessity in this Report to enlarge upon the many advantages connected with a system of thorough drainage. At this time of day no argument is required to convince the farmers of Ontario that if they wish to be able to sow early and reap early, if they wish to render the soil of their farms more easily worked, if they wish to improve the yield and quality of their grain, and lessen the chances of injury by spring frosts and rain; if, in short, they wish to place the result of their labours as far as possible beyond peradventure, and ensure a good crop as far as such a thing can be ensured, they must make the drainage of their farms an object of the first importance.

It is a question whether lands of all sorts may not be improved by draining; but, at any rate, there is no doubt whatever that the only way to render a wet, low-lying or swampy piece of ground of any practical value to its owner, or to increase the productiveness of those lands which have a stiff, dense, water-retaining subsoil, is to rid them of their superfluous moisture.

Much has been done throughout the Province in the way of draining of late years; more, much more, remains to be done. Many farmers have found their time and energies fully absorbed in the preliminary work of clearing their lands and erecting the necessary buildings, and others have been deterred by want of means. Both these obstacles, however, are now being rapidly overcome, and with the universal recognition of the benefits

to be derived from draining it may be expected that the area of land thus improved will year by year steadily increase.

An experienced farmer in Lambton county puts the case in a nutshell when he says, "While crops on drained land may suffer, those on undrained lands perish. Farmers are coming to the conclusion that without proper drainage farming is a lottery, with ten chances to one against them."

The character of the past year was such as to bring out in marked relief the difference between the results on drained and undrained lands. When the season opened it was found that on wet and undrained lands fall wheat and clover had been badly "winter-kill-d," while on high lying and well drained soils the loss from this cause was scarcely appreciable. In like manner, while the unusually prevalent frosts in spring inflicted great damage upon these crops on wet lands, where the plants were protected by a good system of drainage little or no injury was done. Again, seeding operations generally were retarded by early rains, but the delay was considerably greater upon wet than upon drained lands. As a result of late seeding upon heavy, damp, undrained soils, not a little spring wheat, especially in the eastern part of the Province, was stricken with rust and rendered useless. June frosts in the West Midland counties likewise did serious damage to the pea and barley crops, where want of drainage permitted the moisture to remain. In fact, if any lesson is to be drawn from last year's operations, it is that it will abundantly pay the farmer to thoroughly drain his land wherever it is in need of drainage.

The November reports to the Bureau showed that in some localities the lesson had been already taken to heart, and farmers were busy laying as many yards of drain as time and means would permit. Surface drainage is of course better than none; but it is not so effective, and in the end is more expensive than under drainage. For the latter the principal material used is tile, which is growing in favour. In ordinary lands two-inch tiles do very well, though the size may be increased to three and four inches with advantage where there is more than the usual amount of water.

There would appear to be a scarcity of tiles in various parts of the Province, and some farmers complain that they have been obliged from this cause to defer drainage operations which they would otherwise have undertaken. As far as known there are in the Province 107 tile yards, and returns received from 36 of these show that there was manufactured last year about five and a half millions of tile, or sufficient to construct more than one thousand miles of drain works. Other materials used are stone and wood, the latter usually in the form of 2x4 inch scantling, with pine or hemlock boards for top and bottom.

FALL PLOUGHING.

The work of ploughing and preparing the land for the spring was delayed a good deal in consequence of the general lateness of the season, and the pressure of fall seeding. It was still further delayed by the unfavourable condition of the soil, lack of rain having allowed the ground to become quite dry and hard. Reports from all parts of the country were unanimous in saying that it was impossible to plough stubble land except in favoured situations, and that fall ploughing had never been so backward. The latter part of the season, however, was more favourable; rain came in abundance, and farmers prosecuted their work with vigour. In this they were aided very much by an unusually long season of fine, open weather; yet in many sections the labour of the ploughman was ended for the year only by the setting in of winter.

FARM ACREAGE AND VALUES.

The acreages of land occupied and cleared have been obtained partly from farmers themselves and partly from the returns made by assessors. The values are those given by farmers, though owing to omissions they have necessarily been supplemented to a small extent by estimates based on average values in the respective localities.

As will be seen by Table No. VI. the total number of farms returned for the Province is 201,898; the number of acres occupied, 19,622,429; the number of acres cleared,

10,218,631. This gives an average number of acres per farm of 97.2, and of acres cleared per farm of 50.5.

Table No. XI. gives the number of farms, the acres occupied, and the acres cleared, as shown by the census returns of 1851, 1861 and 1871 respectively. The number of farms in Ontario in the last of these years was 172,258; the number of acres occupied, 16,161,676; and the number of acres cleared, 8,833,626. The increase in the number of farms during the last eleven years has therefore been 17.2 per cent.; in the number of acres occupied, 21.5 per cent.; and in the number of acres cleared, 16.5 per cent.

The average number of acres per farm in 1871 was 93.8, showing that there has been a slight increase in the acreage of farms during the eleven years. The number of acres cleared per farm was 50.5, or slightly less than the average for the past year.

According to Table No. VI. the total value of farm land in the Province in 1882 was $632,342,500; of buildings, $132,712,575; of implements, $37,029,815; of live stock, $80,540,720; being a total, $882,625,610.

These figures show the average value of farm land per hundred acres to be $3,222; of buildings, $676; of implements, $188; of live stock, $410; or an average value per hundred acres, inclusive of buildings, implements and live stock, of about $4,500.

RENT AND WAGES.

The statistics of rent and wages were supplied by the correspondents of the Bureau, and from these the averages for counties, shown in Table No. VII., were compiled.

Correspondents generally complained of the scarcity of labour during the harvest season; and owing to the heavy crop and the unfavourable weather, especially in the western counties where harvesting operations were unusually protracted, wages for farm hands were very high. Three dollars per day was paid in some districts during the wheat harvest.

From this table it would appear that the highest average rate of rent per acre, $4.25, is paid in the county of Durham; the lowest, $1.40, in Renfrew. The highest average rate of wages paid to farm hands, per year, with board, $235, was paid in the county of Glengarry; the lowest, $110, in Algoma. The highest average without board, $380, was paid in Ontario; the lowest, $200, in Prince Edward. The highest average rate per month, with board, $20, was paid in Perth, Stormont, Glengarry, Peterborough, Algoma, Muskoka and Parry Sound; the lowest, $14, in Prince Edward. The highest average rate per month without board, $30, was paid in Peel, Ontario, Algoma and Muskoka; the lowest, $20, in Oxford, Durham and Prince Edward. The highest average rate per day with board, $1.50, was paid in Algoma; the lowest, 77 cents, in Dundas. The highest average rate per day without board, $1.60, was paid in Ontario; the lowest, $1, in Northumberland, Dundas and Peterborough. The highest average rate paid to domestics per week, with board, $1.90, was paid in Lennox and Addington; the lowest, $1.25, in Welland and Russell.

MAPLE SUGAR.

By comparing the column "Maple Sugar" in Table V. with the corresponding column in Table XI., it will be seen that the manufacture of that article, which had nearly doubled in the decade between 1851 and 1861, had slightly fallen off in the next ten years; while for the eleven years just closed the total annual product fell to the extent of about one million and a quarter pounds. The quantity manufactured in the Province in 1871 was 6,247,442 pounds, and in 1882, 5,073,610 pounds. This reduction is less than might be expected, when we take into account the rapid denudation of our maple forests in ordinary clearing, as well as for purposes of fuel, the cheapening of the common grades of cane sugar within the last quarter of a century, and the increasing wealth of our farmers, which makes them less and less inclined to resort to the formerly important economy of the sugar bush.

AGRICULTURAL EXPORTS.

In Table No. X. are given the chief exports of agricultural products and animals and their products, by quantities and values, from the Provinces of Ontario and Quebec for the eleven years ending 30th June, 1881, as furnished by the Trade Returns to the Dominion Parliament.

It will be noticed that a large proportion of the total exports is credited to Quebec. This is because the bulk of shipments of Ontario produce is made at Montreal, and credited to that port.

An approximation to the true apportionment for each Province may be obtained by comparing the produce of 1870-1, as given by the census, with the exports for the same year. In this way we readily get the amount consumed at home, and the amount available for export. Take wheat and butter, two of the principal articles of export and home consumption.

	Wheat—(Flour included.)		Butter.	
	Produced.	Exported.	Produced.	Exported.
	Bushels.	Bushels.	lbs.	lbs.
Ontario	14,233,289	708,413	37,623,643	2,366,957
Quebec	2,058,076	2,367,242	24,289,127	12,329,584
Totals	16,291,365	3,075,655	61,912,770	14,696,541

The average consumption of wheat in both Provinces in 1870-1, for bread and seed grain, was according to this statement 4.70 bushels per head of population, which is a fraction less than the estimate for England. This would give for home consumption in Ontario 7,615,000 bushels, and in Quebec 5,600,000 bushels, leaving the latter with a deficit of 3,542,000 bushels, and the former with a surplus of 6,618,000 bushels. Ontario, therefore, besides supplying the deficiency in Quebec, should be credited with the full amount of the wheat and flour exports of the year.

By the same process it may be shown that a correct apportionment of butter exports for 1870-1 would give to Ontario 10,400,000 lbs. instead of 2,366,957, and to Quebec 4,300,000 lbs. instead of 12,329,584.

A fair estimate would give to Ontario at least 75 per cent. of the total exports.

The percentage of agricultural exports from the two Provinces to Great Britain has increased almost steadily since 1871. The rate for each year is as follows :

In 1871, 42 per cent. of the whole ; 1872, 45.5 ; 1873, 51.4 ; 1874, 53.6 ; 1875, 52.6 ; 1876, 48.1 ; 1877, 52.4 ; 1878, 60.5 ; 1879, 59.5, in 1880, 61, and in 1881, 59.3 per cent.

Up to 1876 fully 80 per cent. of the exports credited to Ontario were shipped to the United States. Since that year the returns show a considerable increase in the shipments to Great Britain.

THE DAIRY.

The dairying industry, in so far as it relates to the manufacture and export of cheese, is a large and thriving interest, and is extending its operations year by year.

CHEESE.

Cheese factories were first established in the Province about sixteen years ago, prior to which time the supply of home manufactured cheese was not sufficient for local wants, and large quantities were annually imported. During the past year nearly five hundred factories were in operation in the Province, and for several years past the annual export of cheese has been very large.

Various methods of conducting factories are employed. In some cases they are run on the coöperative plan, in which the farmers of a neighbourhood join and share in the

proceeds above expenses, in proportion to the quantity of milk they have contributed; in others the factory is conducted by an individual or a company, and the milk is paid for in cash.

Canadian cheese is held in high esteem in the English market, and commands the top price. At International Exhibitions, too, our cheese manufacturers have always come off with their full share of honours received in competition with the world.

The interests of the dairying industry are carefully fostered and looked after by two incorporated Dairymen's Associations, in the eastern and western sections of the Province respectively, and regular cheese markets are established at various points in the dairying districts in both sections.

The statistics of cheese products for 1882 are given in Table No. XII. The number of factories and the addresses of managers were obtained from the reeves and deputy-reeves of townships, in response to circulars sent to them asking for that information. The total number of factories so reported to the Bureau was 471, and schedules were sent to each to be filled up with a statement of the produce of the year.

Returns have been received from 306 factories of the quantity of milk used and the quantity and value of cheese made; and, of these, 266 have given in addition the number of their patrons, and the number of cows whose milk was supplied. The latter show totals and results as follows:

Quantity of Milk used (266 Factories)	lbs. 233,105,965
Quantity of Cheese made	" 22,372,566
Value of Cheese made	$2,201,712
No. of Patrons of Factories	13,349
No. of Cows whose milk was supplied	85,226
Average return for each Patron	$164.93
Average value of Cheese per Cow	$25.83

The total quantity of milk used in the 306 factories was 265,813,755 lbs., and the total cheese product was 25,562,431 lbs., or an average of 10.6 lbs. of milk to one pound of cheese. The value of the cheese product was $2,767,085, or 10.8 cents per lb. With such a high average for the whole season, it is not surprising to find that only a very small supply remains in first hands.

An examination of the returns by Counties shows that there are two districts of nearly equal area, situated in the eastern and western sections of the Province, in which the great bulk of our cheese is produced. The western section comprises the counties of Elgin, Lambton, Huron, Middlesex, Oxford and Perth; while the eastern comprises Northumberland, Lennox and Addington, Leeds and Grenville, Hastings, Stormont and Glengarry.

These twelve counties give a return of 19,521,487 lbs., or rather more than three-fourths of the entire product of the Province. In the six counties of the western group the quantity of milk used was 104,093,609 lbs., of which the cheese product was 9,636,636 lbs., or an average of 10.80 lbs. of milk for a pound of cheese. The quantity of milk used in the six counties of the eastern group was 99,495,994 lbs., yielding a product of 9,884,851 lbs., being an average of 10.06 lbs. of milk for a pound of cheese—or three-quarters of a pound less than in the western district. This difference, though apparently trifling, is large when considered with regard to aggregate results. Assuming the cheese-producing quality of milk in the western counties to equal that of the eastern counties, it would give on last year's make an increased product of 355 tons.

But considered from another point of view the comparison is not so favourable to the eastern counties. Taking the factories for which complete returns have been received, the number of cows, quantity of milk, and quantity and value of cheese are found to be as follows for each district:

WESTERN.	Cows.	Milk.	Cheese.	Value.
		lbs.	lbs.	$
Elgin	3,315	9,686,148	937,156	100,980
Lambton	1,949	4,942,997	479,808	51,524
Huron	3,697	9,568,228	932,774	103,477
Middlesex	6,635	21,070,043	2,032,125	223,837
Oxford	6,065	19,313,390	1,885,217	204,659
Perth	5,472	20,453,182	1,529,981	170,504
Totals	27,133	85,033,988	7,797,061	854,981
EASTERN.				
Northumberland	4,036	11,851,844	1,174,034	128,027
Lennox and Addington	3,425	7,767,209	749,894	82,144
Leeds and Grenville	7,229	17,552,253	1,642,554	178,249
Hastings	8,552	23,118,197	2,352,132	256,142
Stormont	4,205	7,920,599	803,170	69,059
Glengarry	11,000	26,000,000	2,600,000	300,000
Totals	38,447	94,210,102	9,321,784	1,013,621

The standard yield of milk per cow is 3,000 lbs.; but the average in the western counties last year was 3,134 lbs. per cow, while in the eastern counties it was only 2,450 lbs. Compared again by the value of cheese product, the average of western cows is found to be $31.51, and of eastern cows only $26.36.

How these differences are produced is a question worthy of enquiry by dairymen. Account must be taken of various elements, such as condition of soil, supply of water, breeds of cattle, length of seasons, etc. It will probably be found that the higher cheese-producing quality of eastern milk is mainly due to the large infusion of Ayrshire blood in the dairy stock, as well as to rich limestone pastures and an abundant supply of pure water; while the higher averages of milk supply and values in the western districts may be results of a longer operating season. But additional data are required before a satisfactory explanation can be given.

BUTTER.

It is a matter of regret that a like encouraging report cannot be given of the butter trade. So far, very few attempts have been made to establish creameries for the manufacture of butter on a system that will ensure uniform excellence of quality. In a few districts a beginning has been made in this direction within the last year or two, and creameries to the number of sixteen, of varying capacity, have been in operation during the season of 1882. Reports from six of these show that they manufactured during the season 135,092 lbs. of butter, valued at $30,304.46. In two factories 24,822 inches of cream produced 23,411 lbs. of butter, and in two others 1,753,241 lbs. of milk produced 64,807 lbs. of butter. The remaining two made both butter and cheese—the latter to the extent of 146,436 lbs., which was sold for $10,925.

Various systems of collecting the milk and of dealing with patrons are followed. Several are conducted on the coöperative plan; in others the milk, or cream, is paid for in cash or is manufactured into butter at so much per pound, the patron receiving back the entire product.

With the exception of these few instances the butter of the country is made in small lots by individual farmers, each as a general rule employing the milk of from two to a dozen cows, and it is sold to the country store-keeper or local butter dealer, who makes it over and re-packs it for shipment. There is no general system of inspection; much of the butter, owing to lack of care and proper appliances, is inferior in quality, and it is impossible for the shipper, out of such a great variety of sorts, to establish anything like a uniform brand that will command respect in the English market.

The only exceptions to this rule worthy of note are found in eastern Ontario, where more attention has been paid to improving the quality of butter and the style of putting it up for the market. In the vicinity of Brockville and other places where dairying is carried on extensively, dealers are able to secure their butter in large lots from individual

makers, and a system of careful inspection and grading has been established with good results.

Ontario undoubtedly has all the natural advantages requisite to enable her to produce the best quality of butter, as she does of cheese, and it only requires a more general adoption of improved methods of manufacture and packing to secure for it the same respect when shipped abroad.

MANUFACTURES.

In aiming to collect statistics of the manufacturing interests of the Province, it was deemed advisable to limit the work to what may be termed the factory industries. The addresses of manufacturers were procured from Bradstreet's Report, and early in December a circular was issued explaining the objects of the Bureau, and the method upon which it was proposed to tabulate the returns. The form of schedule adopted was similar to the one used in taking the Dominion census, saving that it asked only for the total number of employés instead of a classification by sexes and ages.

The returns, as far as made, were carefully filled; only a few required to be sent back for addition or correction. But the number was not so satisfactory, for, out of a total of 5,838 establishments to which circulars were addressed, less than a sixth have made responses. With such a small proportion of the whole, it would obviously be unsafe to make estimates of aggregate capital, wages, or products for the whole Province.

It is doubtless true, also, that many small establishments in the several classes of factory industries have been missed—such, especially, as are located in hamlets, or in the rural districts. At any rate the numbers in a majority of classes are less than they were in 1871, as shown by the census for that year; and the presumption is that they have not diminished, but increased.

But fragmentary as are the statistics of manufacturing industries furnished to the Bureau, they afford evidence of great progress having been made during the past twelve years. In the following statement a few of the principal industries are selected for comparison—those for 1871 being taken from the complete returns of the census for that year, and those for 1882 from Table No. XIV. of this report.

INDUSTRIES.	1882.				1871.			
	No. of Industri's.	Hands.	Wages.	Product.	No. of Industri's.	Hands.	Wages.	Product.
			$	$			$	$
Agricultural Implement Works ..	44	2,397	954,586	3,833,018	173	2,143	745,693	2,291,989
Brick and Tile Yards	39	425	105,177	239,110	309	1,939	229,842	577,904
Breweries and Malting Houses...	16	192	79,510	526,475	105	536	174,708	1,198,918
Cabinet and Furniture Factories .	38	1,045	378,682	974,932	536	2,769	799,695	2,306,076
Carriage and Waggon Shops	96	672	214,402	627,238	1421	4,780	1,259,799	3,078,841
Cotton Factories	3	1,139	256,960	683,400	5	495	87,400	492,200
Edge Tool Works	3	171	76,900	203,000	22	223	82,871	204,405
Engine and Boiler Works	11	496	216,700	570,000	17	687	257,638	945,150
Flour and Grist Mills.....	76	477	182,271	4,994,461	951	2,759	833,959	27,115,796
Foundries and Machine Works...	27	1,150	476,100	1,439,425	258	4,686	1,587,018	4,631,850
Hosiery Factories	13	801	196,850	792,400	10	244	39,113	198,642
Musical Instrument Factories. ..	3	270	130,000	380,500	26	387	165,539	496,012
Paper and Pulp Mills.....	4	168	58,000	284,000	12	344	99,270	487,500
Salt Works	6	100	30,000	108,000	16	175	60,990	119,999
Sash, Door, and Blind Factories..	30	440	163,753	586,900	156	1,548	485,069	1,546,898
Saw Mills.	72	3,466	1,155,373	3,160,705	1837	13,851	2,675,390	12,733,741
Tanneries	34	269	100,116	675,950	426	1,584	449,043	3,420,218
Woolen Factories.....	34	2,000	491,436	2,445,060	233	3,696	761,934	4,589,119
Totals	549	15,678	5,266,816	22,524,574	6513	42,846	10,794,971	66,435,258

This statement requires no analysis. It is manifest that there has been a large increase of manufactured product, as well as of hands employed and wages paid. The forty-four agricultural implement works giving returns for 1882, for example, make a better exhibit than the 173 giving returns for 1871. Another noticeable fact is that the average production of manufactures per hand employed is, in almost every class of industry, larger in 1882 than in 1871—a result, doubtless, of the more general use of improved machinery. The cotton and lumber industries are the only apparent exceptions, but in the case of the former the low average of 1882 is explained by the circumstance that one of the factories was in operation for less than a third of the year. It will also be noticed that there has been a general rise in the average of wages paid for labour.

Table No. XIII. gives the statistics of manufactures by counties, and Table No. XIV. by industries. The totals of capital, hands, wages, raw material and product are the same in each, the only difference being in the classification. Table XIV., however, gives in addition the average of yearly wages for each industry, the per centage of raw material in the manufactured article, the value of the net product (being the value of finished article less raw material), and the average annual value of net product per hand employed. Under the two heads last named are included, besides the cost of labour, such items as rent, insurance, commission, taxes, fuel, cost of management, and the profits of the manufacturer. A study of this table will make clear the fact that the importance of an industry is not measured by the value of the product. Take flour and grist mills as an instance; the gross product is very large, but 88 per cent. of it is raw material.

The industries classed under the head of *Miscellaneous* are largely composed of the specified ones, but as the returns for them were made in bulk form they could not be separated. A manufacturer having a saw mill and a planing mill, or a flouring mill and a tannery, for example, would fill out his schedule with the totals for both, and as its contents could not be tabulated with either they were placed under the general head. Some of the largest returns received were of necessity entered in this way. In other cases only one establishment of a kind reported, and these were placed in the miscellaneous class also.

The returns of agricultural implement works, to which reference has already been made, give a good indication of the progress of the Province agriculturally, even had we no other evidence of it. The total number of these establishments, as appears by the table, is 122, but there is a large number of foundries, doing a mixed business, which might properly be included in the same class. An idea of the extent to which improved implements of husbandry are used by the farmers of the Province may be obtained from figures given in a few of the complete returns. In fifteen establishments 8,786 single reapers were made last year; in sixteen, 6,979 single mowers; in four, 425 combined reapers and mowers; in three, 800 self-binding harvesters; in five, 2,880 seed drills; in six, 8,140 sulky rakes; in one, 120 threshing machines, and in four, 8,000 ploughs. The total number of those implements made for last year's market must consequently be large.

As affording some useful data for making an estimate of the extent of manufactures in the Province, it may be stated that of the 919 establishments making returns, ten employ over 300 hands each; eleven employ 200 to 300; twelve employ 150 to 200; twenty-one employ 100 to 150; fourteen employ 75 to 100; thirty-three employ 50 to 75; seventy-six employ 25 to 50; and seven hundred and forty-two employ less than 25.

It is not necessary to enlarge on the importance and value to the Province of full returns of its varied industries; no other information is so likely to attract to us a goodly share of the capital and labour awaiting opportunities for employment in the overcrowded countries of Europe.

WHEAT AVERAGES IN GREAT BRITAIN AND IRELAND.

In the following table is given the average yield of wheat per acre in Great Britain and Ireland for the 27 years 1852–79, as calculated by J. B. Lawes and J. H. Gilbert. The produce of the permanent experimental wheatfield at Rothampstead is taken as the basis, and its averages are corrected by such data as the total area under crop in the

United Kingdom, the quantity returned to the land as seed, the consumption per head of the population, and the imports. The low averages of recent years are a result of the bad seasons.

Years.	Average yield per acre.	Years.	Average yield per acre.	Years.	Average yield per acre.
	Bush.		Bush.		Bush.
1852-3	22 7/8	1861-2	25 1/4	1870-1	30
1853-4	20 7/8	1862-3	29 1/2	1871-2	24
1854-5	34 3/4	1863-4	38 3/4	1872-3	24
1855-6	27 3/8	1864-5	35 1/2	1873-4	22 1/2
1856-7	27	1865-6	30 5/8	1874-5	29 1/4
1857-8	33 1/8	1866-7	25 1/8	1875-6	22 7/8
1858-9	31 1/2	1867-8	21	1876-7	25
1859-60	26 1/8	1868-9	34	1877-8	26 1/2
1860-1	22 1/8	1869-70	27	1878-9	30

The average annual yield per acre for the 27 years is 27 5/8 bushels, of 61 lbs. per bushel. Reduced to the standard of 60 lbs., the average would be 28 1/2 bushels per acre. The yield per acre for 1878-79, reduced to the standard, would be 30 1/2 bushels, and that of 1863-64 (the highest of the period), 39 3/8 bushels.

THE WEATHER.

Recognizing the importance to the farmer of a systematic and careful record of temperature, sunshine, rainfall and other meteorological conditions upon which so largely depends the success or failure of his peculiar industry, the Bureau shortly after its practical organization made arrangements with the Meteorological Service for the publication of its weather Reports.

The variation of temperature and sunshine is so slight over comparatively large areas that the results obtained from a few observatory stations carefully distributed throughout the Province suffice for the purposes of the Bureau. The rainfall, however, is so unevenly distributed, and local showers are so frequent at certain seasons of the year, that, in order to give the results of observations a general practical value, reports should be made from a large number of stations. With this view, and with the co-operation of the Bureau, the number of rain gauges in the Province was nearly doubled; so that there are now upwards of one hundred observers contributing to this department of the work. The records of their observations have been published in the several special reports of the Bureau in detail.

Up to midsummer of the past year there were only two sunshine register stations in the Province, one at Toronto and the other at Woodstock. An officer of the Meteorological Service was commissioned by the Government to procure eight new instruments in Great Britain. These have been set up at suitable points throughout the Province, and during the present year will be utilized to render still more valuable this particular feature of the weather reports.

The results of observations of temperature, rain and snow-fall and sunshine are given in Tables XV., XVI., XVII., XVIII. and XIX. The following is a summary for each month:

JANUARY.

The mean temperature of the month was nearly normal at Toronto, but in western Ontario it was slightly in excess, being as much as two degrees above the normal at Port Stanley and Port Dover on Lake Erie. In the northern portions of the Province the temperature was two degrees below the normal. The minimum temperature—all below zero—registered during the month at various points in the Province was as follows: Toronto, 17.4; Hamilton, 11.3; Guelph, 22.; Owen Sound, 24.; Orillia, 35.; Strathroy, 20.6; Stratford, 31.; Cornwall, 29.3; Gravenhurst, 35.; Lindsay, 35.6; Pembroke, 40.7; Rockliffe, 43.4; Huntsville, 47.4.

The rainfall was slightly above the average. The distribution was as follows: In the west and southwest district it was 1.44 inches, or 0.23 below; in the north and north-west district it was 1.08 inches, or 0.38 inches above; in the central district it was 1.22 inches, or 0.06 inches above, and in the north-east and east district it was 0.96 inches, or 0.12 inches above. The snowfall for the same districts respectively was as follows: 9.5 inches or 7.2 inches below the average; 20.4 inches, or 5.2 inches below the average; 7.8 inches, or 7.6 inches below the average; 20.7 inches, or 1.3 inches above the average.

FEBRUARY.

The principal feature of the month in Ontario was its unusual mildness, the temperature in some places exceeding the average by as much as 10°. The minimum temperature (below zero) recorded at various points in the Province was as follows: Parry Sound, 9; Lindsay, 1; Cornwall, 7; Pembroke, 13; Gravenhurst, 7; Owen Sound, 2.

The rainfall for the month was above the average. In the south and south-west district it was 1.66 inches, or 0.69 inches above the average. In the west and north-west district it was 0.69 inches, or 0.31 inches above the average. In the central district it was 1.18 inches, or 0.58 inches above the average, and in the east and north-east district it was 0.95 inches, or 0.37 inches above the average. The snowfall fell far short of the average of February. In the south and south-west district it was 4.3 inches, or 6.2 inches below the average. In the west and north-west district, 11.7 inches, or 2.8 inches below the average. In the central district it was 5.4 inches, or 6.5 below the average, and in the east and north-east district it was 10.6 inches, or 5.2 inches below the average.

MARCH.

The mean temperature of the month was above the average in western and southern Ontario, and below the average in the north-eastern part of the Province.

The rainfall was above the average. In the south and south-west district it was 2.74 inches, or 0.82 inches above the average. In the west and north-west district it was 1.96 inches, or 0.90 inches above the average. In the central district it was 1.58 inches, or 0.15 inches above the average, and in the east and north-east district it was 1.23 inches, or 0.24 inches above the average. The snowfall for the same districts respectively was as follows: 13.1 inches, or 4.7 inches below the average; 16.4 inches, or 5.5 below the average; 4.6 inches, or 18.5 inches below the average; 12.6 inches, or 8.3 inches below the average.

APRIL.

The month of April was colder than the average in Ontario. It opened fine and spring like, with rains and thunder storms in some localities, but about the 9th a rapid change occurred. The temperature fell considerably below the average, and there were high squally winds, mostly from the north and north-west, with snow. A slight improvement occurred from the 16th to the 19th, but another sudden change took place on the 20th, and the weather from that day to the end of the month continued cold, with keen blustering winds and sharp frosts. The fall of rain and snow was considerably below the average, the defect in the several districts being as follows: South and south-west district, 0.5 inches; west and north-west district, 0.16 inches; in the central district 1.14 inches, and in the east and north-east district 0.57 inches.

MAY.

The month of May was considerably colder than usual in Ontario, the defect varying from 4° to as much as 7° in some localities, and only on five days did the temperature exceed the average of these particular days. The month opened with a continuation of the weather experienced in the end of April,—cold, blustery winds prevailing, with snow pretty general on the 1st and 2nd. The weather continued cold and unseasonable during the first week, vegetation scarcely advancing. On the 8th a warm rain fell, and the

following day was remarked in many localities as the first spring day of the season. This was followed, however, by a rapid change on the 10th, the winds becoming more northerly and easterly, and blowing with great violence, accompanied by heavy rains. It gradually cleared by the 13th and became more agreeable, the nights still continuing cold, with an almost regular succession of frosts, while little or no rain fell. Severe frost occurred on the night of the 23rd and the morning of the 24th, ice forming in many places. After this the weather became more seasonable, the month ending warm and pleasant. Under date of the 27th it is noted from Ottawa that there were very few signs of vegetation some miles north of the city, and that in the woods frost was still in the ground.

The fall of rain in general exceeded the usual amount for May, the quantities in the several districts varying considerably. In the west and south-west district more than double the average quantity fell, while in the north and north-west, on the contrary, the weather was generally dry as well as cold.

In the western part of Ontario trees began to bud on the 7th, chestnuts were in leaf on the 10th, plum trees in blossom on the 20th, and apple trees on the 22nd. Swallows were not seen in some places till the 13th, orioles on the 16th, cardinals on the 9th, whip-poor-wills on the 26th.

JUNE.

The temperature of the month of June was generally below the average in Ontario, frosts having occurred in several localities in the second week, and in some places as late as the 20th, but without much damage to vegetation having been recorded. Thunder storms were numerous, accompanied by heavy rains and occasionally hail, and although the days were bright and warm they were generally followed by cool, chilly nights, retarding vegetation. In the north-eastern part of the Province cherry trees were noted in blossom on the 9th, the first wild strawberries were ripe on the 14th, white clover and red alsike were in blossom on the 18th, and peas on the 28th.

JULY.

The month of July was colder than the average. The defect varied from 1° to 3° in some localities, eighteen days being below their particular averages and thirteen above, with moderate winds, mostly from the south-west and west to north-west. The temperature in many cases during the beginning of the month was low enough to justify "a fire in the sitting-room during the evenings." About the 22nd a considerable change took place, and by the 26th the greatest heat of the month occurred generally in Ontario, accompanied in many localities by severe thunder storms, hail and heavy rain. This did not seem, however, to have impeded farm operations to any extent. One observer in Middlesex (Mr. Anderson) reported that "this is the best hay and harvest time we have ever seen."

The rainfall was considerably under the average, the amounts varying much in localities not far apart. The deficiencies for the several districts are as follows: Western and south-western district, 2.06 inches; for the north-western and northern district, 1.15 inches; for the central district, 1.71 inches; and for the north-eastern and eastern district, 0.41 inches. The heaviest rainfall, so far as heard from, was at Pembroke, where 6.86 inches is recorded; of this amount 2.79 inches fell during a thunder storm on the 27th and 28th. The lightest rainfall occurred at Georgina, in North York, where only 0.25 inches is recorded.

AUGUST.

The month of August was warmer than the average, although it was about 1° 5′ colder than August, 1881. The month commenced fine and warm, the temperature in many places reaching as high as 93° in the shade. About the 6th this was accompanied by frequent heavy rains and high winds, causing injury to the growing crops and sprouting those that were cut. The following week was cool and bright, although light rains were frequent. About the 14th the weather became warmer for a few days; but by the 17th

another change occurred, the temperature falling rapidly, with keen, cool nights, frost being recorded in some places on the 19th. The latter part of the month was warm and pleasant, although some heavy rains fell in many localities about the 21st and 23rd. The last week of the month was seasonably dry and fine.

Thunder storms were frequent, and in some cases were accompanied by hail of large size; fogs, also, were frequent morning and evening.

The rainfall was considerably above the average. In the west and south-west district it was 1.48 inches above the average; in the north-west and north district it was 0.55 inches above; in the central district it was 1.75 inches above, and in the north-east and east it was 0.82 inches above. The heaviest monthly rainfalls, so far as received, were at Maidstone, where 6.28 inches fell; at Sarnia, 5.19 inches; at Birnam, 7.18 inches, and at Newmarket, 5.13 inches. The smallest monthly rainfall appears to have been at Gravenhurst, Muskoka, where only 1.24 inches is recorded to have fallen.

SEPTEMBER.

The month of September was fine and warm, being about 3° above the average, and continuing dry up to the third week, when heavy thunder storms and rains were general in Ontario. The temperature reached its maximum for the month about the 18th, when it was only a little inferior to the maximum of the year (about 90° on the 26th July).

The rain was considerably below the average quantity for September except in the north-east and eastern district, where it was slightly in excess. In the south and south-west district it was 1.09, in the north-west and northern district 1.06, and in the central district 0.98 inches below the average. The heaviest rainfalls are recorded in northern Ontario: at Pembroke, 6.45; at Huntsville, 5.35; and at Beatrice, 5.39 inches fell. The lightest fall was in the extreme west, Sarnia only recording .48 inches.

Hoar frost was recorded in many localities about the 23rd and 24th. Several storms of wind occurred, the one on the 14th being very general and inflicting considerable damage to crops, fences, and buildings.

OCTOBER.

October was considerably warmer than the average, the difference in excess amounting to as much as 6°. It was the second warmest October recorded in forty years, the first and third weeks being very dry and warm.

Some light rain fell about the 13th and towards the end of the month. In the south and south-west district the rainfall was 0.80; in the north-west and northern district, 1.39; in the central district, 0.85; and in the east and north-east district, 1.52 inches below the average.

The heaviest monthly rainfall was recorded at Parry Sound, where 2.95 inches fell; and the lightest at Brechin, where only 0.71 is recorded. Thunder storms were general about the 9th, 29th and 31st.

Some light snow fell about the 10th in eastern Ontario, but the month may be described as singularly fine.

NOVEMBER.

The month of November, though differing little from the average temperature of previous Novembers, was marked with some rapid changes. Up to the 5th cold north and east winds prevailed. On the 6th the winds became more southerly and westerly, and the temperature increased, remaining warm and pleasant. On the 11th the thermometer ranged at some hours as high as 20° above the average. On the 13th a change took place; temperature fell steadily and continued (with some short intermissions) low throughout, the minimum of the month occurring about the 28th. The atmospheric pressure was considerably above the average for the month. The amount of the clouded sky was slightly above the average.

In the south and south-west district the rainfall was 0.92; in the north-west and northern district 0.44; in the central district 0.36, and in the north-east and eastern district 0.50 inches below the average for this month. The heaviest rainfall in 24 hours occurred at Pembroke, on the 12th, where 1.14 inches fell.

The snowfall was slightly in excess, as shown in the same divisions for the rain; the difference was 1.7 inches, 4.5 inches, 2.7 inches, and 3.7 inches.

Auroras were numerous and brilliant, especially one on the 17th, which was seen over the whole continent.

DECEMBER.

The temperature for this month differed little from the average. The cold weather of the end of November continued for a few days, the maximum occurring on the 4th. A rapid change took place on the 6th, the temperature falling rapidly and continuing cold up to the 18th. The latter part of the month was fine and warm, with falls of snow occasionally, and some light rains about the 21st and 22nd.

The rainfall was far below the average, the deficiency for Ontario amounting to 1.17 inches. The snowfall, however, was 8 inches above the average. At some stations it fell to a great depth. At Zurich 81 inches are reported; at Penetanguishene, 59 inches; at Orillia, 53 inches; at Durham, 61 inches, and at Egmondville, 64 inches. The heaviest snowfall in 24 hours is recorded at Zurich, where 29 inches is reported to have fallen on the 16th.

The amount of clouded sky was excessive throughout Ontario during this month.

POPULATION RETURNS.

Table No. XXI. gives the population of the Province for the years 1872, 1877, 1878, 1879, 1880, 1881 and 1882, as returned by the assessors, and for 1881, as shown by the Dominion census enumeration. The table also gives the occupied acreage of each municipality in the Province for the past year.

There are a few obvious discrepancies in the returns of population made by assessors, but they are not of a character to appreciably affect the totals. This enumeration embraces all persons occupying or residing upon property entered on the rolls for assessment; and although there are in every municipality a number of persons of whom no account is taken, the uniformity of the system makes it useful and reliable in comparing one year with another. As far as it goes, it gives the actual population of the Province. The Dominion census, besides being taken on the *de jure* system, includes our Indian population, which, of course, is omitted in the Municipal census.

The population of Ontario by the Dominion census of 1871 was 1,620,851, of whom 1,607,873 were whites, and 12,978 were Indians. The population by the census of 1881 was 1,923,228, of whom 1,907,903 were whites, and 15,325 were Indians. These figures show an increase for the decade of 300,030 in the white, and of 2,347 in the Indian population, or a percentage of increase for the period of 18.6 and 18.8, respectively.

In the Municipal censuses for 1872, 1881 and 1882, the returns for Algoma, Parry Sound and Nipissing were so incomplete that to include them would be misleading. Exclusive of these districts, the Municipal returns give a population of 1,406,597 for 1872, and of 1,685,114 for 1882, showing an increase for the decennial period of 19.7 per cent. The ratio of increase in the same territory, as shown by the Dominion census, was 17.3 per cent., or 2.4 per cent. less for the ten years; consequently the Municipal figures, as regards the growth of population, do not err on the side of under-statement.

The rural population of the Province in 1872, as shown by the table, and exclusive of the northern districts, was 1,038,379; in 1882 it was 1,112,848, being an increase of 7.1 per cent. The population of unincorporated villages is included in this statement.

The urban population of the Province in 1872 was 368,218, and in 1882 it was 572,266, or an increase for the ten years of 55.4 per cent. It must be borne in mind, however, that many villages which were classified with the township returns in 1872 have since become incorporated, and are now classified with the urban population,—the increase for the decade being 81. The total number of cities, towns and villages in 1872 was 119; in 1877, 173; in 1878, 182; in 1879, 187; in 1880, 195; in 1881, 198; and in 1882, 200.

The following table gives the population classified into rural and urban and the increase or decrease of each for the several years, exclusive of Algoma, Parry Sound and

Nipissing. It will be noticed that between the censuses of 1881 and 1882 there was a considerable decrease in the rural population—much more than can be accounted for by the incorporation of new villages in that interval.

Years.	Population.			Increase or Decrease.		
	Total.	Rural.	Urban.	Total.	Rural.	Urban.
1872	1,406,597	1,038,379	368,218	.....	.....	.....
1877	1,617,364	1,105,880	511,484	210,767	67,501	143,266
1878	1,637,112	1,108,956	528,156	19,748	3,076	16,672
1879	1,666,635	1,122,982	543,653	29,523	14,026	15,497
1880	1,678,412	1,125,914	552,498	11,777	2,932	8,845
1881	1,683,268	1,124,999	558,269	4,856	915	5,771
1882	1,685,114	1,112,848	572,266	1,846	—12,151	13,997
Total increase 1872-82.....	278,517	74,469	204,048	278,517	74,469	204,048

The population of County Municipalities is given in the table according to their present bounds, and the cities, towns and villages are given throughout according to their classification as such in 1882.

CONCLUSION.

In concluding this Report I am conscious that in several respects it falls short of what a complete report on the industries of the country should be. There are difficulties in the way of procuring information which cannot be overcome at once. The best sources are not always available; besides, some persons neglect to answer enquiries, some refuse, and others misunderstand their import.

Time is required for organizing an efficient staff of correspondents, as well as for establishing confidence in the Bureau and familiarizing the people with its work and objects. A great deal of its usefulness must necessarily depend on the local correspondents, of whom there should be one or two in every township. Good judgment and a habit of careful observation are among their first qualifications. Experience is valuable, especially in reporting on matters of an agricultural interest; and persons who know that they will be asked to give information are likely to prepare themselves for giving it accurately. Hence permanency of the staff is desirable. It is, indeed, one of the conditions of success; but as the only remuneration given to correspondents is a copy of the Reports of the Bureau, it is obvious that they must be men having their heart in the work—who feel that they are promoting the interests of the whole country, as well as their own. The service of a large number of such men has been secured already, but more are needed to make the staff complete.

The statistical work has been heavy, and in the preparation of Special Reports it was necessary at times to employ a number of extra clerks; but all of the Bureau's operations were conducted throughout the year on such views of economy as were considered to be consistent with the greatest promptness and efficiency. The forms of circulars and schedules addressed to correspondents, farmers, manufacturers and others during the year are appended.

A. BLUE,
Secretary.

Bureau of Industries,
Toronto, January 25th, 1883.

STATISTICS OF

AGRICULTURE, MANUFACTURES,

AND POPULATION.

WHEAT, BARLEY, OATS RYE,

TABLE No. I.—Showing by County Municipalities and Groups of Counties the Acreage Ontario, as returned 31st May, 1882; together with the Produce of each kind

COUNTIES.	Fall Wheat.		Spring Wheat.		Barley.		Oats.	
	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.
Lake Erie Counties:								
Essex	39303	903969	923	14768	1371	39759	24417	805761
Kent	59858	1556308	510	7650	7384	221520	27982	1175244
Elgin	52158	1460624	175	3150	5652	163908	32655	1208235
Norfolk	34476	896376	162	2268	6913	200471	26253	840096
Haldimand	34946	733866	1227	14724	19079	381580	19915	657195
Welland	27983	447728	606	9090	4108	78052	19209	499434
Totals	248724	5998871	3603	51650	44507	1085290	150431	5185965
Lake Huron Counties:								
Lambton	39773	954552	4335	56355	18731	430831	32296	1033472
Huron	91067	2640943	18004	234052	27352	847912	60123	2284674
Bruce	66202	1986060	10992	142896	19157	574710	49515	1732990
Totals	197042	5581555	33331	433303	65240	1853453	141934	5051136
Georgian Bay Counties:								
Grey	50277	1508310	51366	770490	28431	796068	73112	2705144
Simcoe	66719	2068289	37118	593888	28177	788956	48448	1647232
Totals	116996	3576599	88484	1364378	56608	1585024	121560	4352376
West Midland Counties:								
Middlesex	102282	2761614	1791	32238	22018	594486	64416	2318976
Oxford	49245	1231125	2982	44730	22155	708960	45072	1667664
Brant	35790	930540	873	13968	16260	504060	17167	686680
Perth	60403	1691284	9288	130032	23067	715077	45391	1947943
Wellington	37517	1012959	26595	398925	37829	1134870	56920	2276800
Waterloo	45610	1368300	5401	91817	18190	582080	30795	1231800
Dufferin	13185	395550	24883	348362	10430	260750	23565	754080
Totals	344032	9391372	71813	1060072	149949	4500283	283236	10883943
Lake Ontario Counties:								
Lincoln	25458	661908	990	14850	5029	150870	17106	632922
Wentworth	34605	795915	1238	14856	13643	409299	28198	1099722
Halton	26742	534840	2316	39372	14872	475904	17762	692718
Peel	30636	765900	15467	262939	33572	1175020	24579	983160
York	52568	1419336	26676	480168	58378	1809718	56108	2412644
Ontario	17014	510420	49164	835788	42750	1282500	41305	1321760
Durham	4226	114102	42676	853520	46290	1481280	30573	1253493
Northumberland	10556	285012	30482	518194	45094	1307726	23363	747616
Prince Edward	4392	61488	5601	67212	47910	1006110	12093	314418
Totals	206197	5148921	174610	3086899	307538	9098418	251087	9458453

PEAS, CORN AND BUCKWHEAT.

under Fall Wheat, Spring Wheat, Barley, Oats, Rye, Peas, Corn and Buckwheat in of Crop, based on Threshing Returns and the Reports of Correspondents.

Rye.		Peas.		Corn.		Buckwheat.		COUNTIES.
Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels in car.	Acres.	Bushels.	
								Lake Erie Counties :
312	6240	2017	44374	27088	2167040	245	4900	Essex.
398	11144	3328	76544	23390	1941370	623	13483	Kent.
1087	22807	8842	159156	15598	1201046	1017	22374	Elgin.
7907	150233	8080	177760	17152	1149184	4592	101024	Norfolk.
2352	47040	12140	194240	2779	150066	411	10686	Haldimand.
888	14208	2914	29140	8315	315970	1524	22860	Welland.
12944	251672	37321	681214	94322	6924676	8412	175327	Totals.
								Lake Huron Counties :
134	2680	4936	88848	8386	436072	354	7080	Lambton.
158	3160	24244	533368	1915	99580	197	3349	Huron.
493	9860	32324	711128	365	18250	245	2940	Bruce.
785	15700	61504	1333344	10666	553902	796	13369	Totals.
								Georgian Bay Counties :
326	6520	40177	803540	335	17420	214	4280	Grey.
3547	85128	28336	566720	768	42240	271	4607	Simcoe.
3873	91648	68513	1370260	1103	59660	485	8887	Totals.
								West Midland Counties :
462	9240	15410	292790	12373	866110	386	6948	Middlesex.
1730	25950	11440	251680	10644	670572	524	10480	Oxford.
1240	18600	7456	126752	6459	497343	646	16150	Brant.
122	2196	19998	439956	906	67950	24	408	Perth.
1109	23289	34197	820728	461	23050	188	3760	Wellington.
745	14900	11325	249150	2493	186975	55	1100	Waterloo.
1463	29260	10687	181679	53	2756	31	496	Dufferin.
6871	123435	110513	2362735	33389	2314756	1854	39342	Totals.
								Lake Ontario Counties :
760	11400	3448	55168	6322	347710	702	28080	Lincoln.
1670	36740	8280	156940	6342	513702	826	22302	Wentworth.
1272	21624	8382	176022	1585	95100	202	4444	Halton.
3708	81576	10382	207640	462	23100	257	3855	Peel.
3418	61524	23760	475200	1930	119660	211	4220	York.
5581	117201	25208	428536	3343	213952	365	8030	Ontario.
9332	167976	26520	530400	2418	145080	543	14661	Durham.
15917	238755	21328	298592	3915	227070	2427	53394	Northumberland.
9459	122976	3874	42614	9169	385098	3188	38256	Prince Edward.
51117	859772	131182	2371112	35486	2070472	8721	177242	Totals.

WHEAT, BARLEY, OATS, RYE,

TABLE No. I.—Showing by County Municipalities and Groups of Counties the Acreage Ontario, as returned 31st May, 1882 ; together with the Produce of each kind of

COUNTIES.	Fall Wheat.		Spring Wheat.		Barley.		Oats.	
	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.
St. Lawrence and Ottawa Counties:								
Lennox and Addington ...	2886	54834	5734	120414	51868	1400436	20396	734256
Frontenac	3312	69552	7510	142690	26381	791430	27053	919802
Leeds and Grenville	10212	194028	11915	214470	14610	394470	57085	1883805
Dundas	3880	73720	3516	56256	9887	355932	25561	1022440
Stormont.....	2155	38790	3942	63072	3572	103588	25137	930069
Glengarry	2362	35430	7132	99848	2516	55352	30454	1063890
Prescott	388	3880	7911	94932	1449	26082	21832	502136
Russell.....	515	10300	3454	55264	931	20482	333	5661
Carleton	4552	63728	25586	358201	6759	202770	52333	2145653
Renfrew	2977	47632	24294	437294	1230	36900	30215	1208600
Lanark.....	6313	113634	13087	248653	2131	61799	28231	1185702
Totals	39552	705528	114081	1891094	121334	3449241	318630	11602014
East Midland Counties:								
Victoria	10568	274768	43732	780696	31579	844633	30676	1104336
Peterborough.....	11358	306666	27106	352388	14702	426358	24168	821712
Haliburton	240	3840	1957	21527	293	5860	4646	92920
Hastings	12831	243789	13072	261440	55698	1404846	37185	1115550
Totals	34997	829063	85867	1416051	102272	2681697	96675	3134518
Northern Districts:								
Algoma	817	20425	11885	309010	385	11465	2315	92600
Muskoka.....	98	1568	1627	29286	424	10176	6700	234500
Parry Sound	65	1300	1516	24256	360	9360	2847	102492
Totals	980	23293	15028	362552	1169	31001	11862	429592

SUMMARY OF RETURNS

Lake Erie Counties.....	248724	5998871	3603	51650	44507	1085290	150431	5185965
Lake Huron Counties.....	197042	5581555	33331	433303	65240	1853453	141934	5051136
Georgian Bay Counties	116996	3576599	88484	1364378	56608	1585024	121560	4352376
West Midland Counties ...	344032	9391372	71813	1060072	149949	4500283	283236	10883943
Lake Ontario Counties	206197	5148921	174610	3086899	307538	9098418	251087	9458453
St. Lawrence and Ottawa Counties.....	39552	705528	114081	1891094	121334	3449241	318630	11602014
East Midland Counties.....	34997	829063	85867	1416051	102272	2681697	96675	3134518
Northern Districts	980	23293	15028	362552	1169	31001	11862	429592
Totals.....	1188520	31255202	586817	9665999	848617	24284407	1375415	50097997

PEAS, CORN AND BUCKWHEAT.

under Fall Wheat, Spring Wheat, Barley, Oats, Rye, Peas, Corn and Buckwheat in Crop, based on Threshing Returns and the Reports of Correspondents—*Continued.*

Rye.		Peas.		Corn.		Buckwheat.		COUNTIES.
Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels in ear.	Acres.	Bushels.	
								St. Lawrence and Ottawa Counties :
8814	132210	8852	185892	3856	173520	1778	64008	Lennox and Addington.
7676	153520	12580	251600	2307	115350	1434	40152	Frontenac.
16893	337860	6246	124920	5830	303160	4905	137340	Leeds and Grenville.
1991	53751	1658	36476	1663	94791	976	31232	Dundas.
1100	22000	2780	55600	1847	92350	2372	59300	Stormont.
145	1450	8102	137734	1054	31620	1764	54684	Glengarry.
352	3520	14118	127062	1620	45360	1586	22204	Prescott.
4088	81760	475	19000	644	19320	195	4290	Russell.
13787	275740	13716	288036	1316	55272	3034	69782	Carleton.
9792	225216	16156	323120	712	46280	988	23712	Renfrew.
13862	287322	9778	254228	1929	81018	6269	206877	Lanark.
78500	1574349	94461	1803668	22778	1058041	25301	713581	Totals.
								East Midland Counties :
1848	33264	14529	290580	504	35280	303	6060	Victoria.
4458	80244	13209	264180	290	15370	404	8080	Peterborough.
401	6817	1452	21780	207	10143	321	3210	Haliburton.
27424	493632	18886	302176	7842	368574	2635	92225	Hastings.
34131	613957	48076	878716	8843	429367	3663	109575	Totals.
								Northern Districts :
105	1575	2658	79740	38	1140	21	630	Algoma.
369	11070	1993	43846	261	7830	273	8190	Muskoka.
336	6720	936	18720	38	1140	60	1800	Parry Sound.
810	19365	5587	142306	337	10110	354	10620	Totals.

BY COUNTY GROUPS.

12944	251672	37321	681214	94322	6924676	8412	175327	Lake Erie Counties.
785	15700	61504	1333344	10666	553902	796	13369	Lake Huron Counties.
3873	91648	68513	1370260	1103	59660	485	8887	Georgian Bay Counties.
6871	123435	110513	2362735	33389	2314756	1854	39342	West Midland Counties.
51117	859772	131182	2371112	35486	2070472	8721	177242	Lake Ontario Counties.
78500	1574349	94461	1803668	22778	1058041	25301	713581	St. Lawrence and Ottawa Counties.
34131	613957	48076	878716	8843	429367	3663	109575	East Midland Counties.
810	19365	5587	142306	337	10110	354	10620	Northern Districts.
189031	3549898	557157	10943355	206924	13420984	49586	1247943	Totals.

BEANS, FLAX, HAY, ROOTS, ETC.

TABLE No. II.—Showing by County Municipalities and Groups of Counties the Acreage in Ontario in 1882, and the Produce of each kind of

COUNTIES.	Beans.		Flax.	Hops.	To-bacco.	Hay and Clover.	
	Acres.	Bushels.	Acres.	Acres.	Acres.	Acres.	Tons.
Lake Erie Counties:							
Essex	240	4560	.....	28	24	26518	35518
Kent	6807	129333	69	20	4	39082	53808
Elgin	952	19040	55	43	.....	41145	51370
Norfolk	1188	27324	161	12	.....	33741	38410
Haldimand	213	3621	32	18	.....	40610	44240
Welland	810	11340	27	.....	.....	40111	42850
Totals	10210	195218	344	121	28	221207	266196
Lake Huron Counties:							
Lambton	270	5130	70	15	.....	39526	47145
Huron	39	741	1068	168	.....	71445	78403
Bruce	57	1140	198	117	.....	61746	64882
Totals	366	7011	1336	300	.....	172717	190430
Georgian Bay Counties:							
Grey	156	2496	203	36	.....	93429	93217
Simcoe	62	496	20	29	.....	60566	70307
Totals	218	2992	223	65	.....	153995	163524
West Midland Counties:							
Middlesex	464	8816	368	38	6	78574	102454
Oxford	276	11040	505	18	8	57306	74712
Brant	952	15232	37	7	.....	29390	33112
Perth	65	1300	1240	166	7	52310	65358
Wellington	13	260	525	50	.....	65107	79199
Waterloo	32	640	676	7	.....	36115	42759
Dufferin	16	320	38	.....	.....	27416	31326
Totals	1818	37608	3389	286	21	346218	428920
Lake Ontario Counties:							
Lincoln	138	2070	4	28	1	33952	38876
Wentworth	203	3045	1	35	.....	40415	51913
Halton	33	495	5	32	.....	28629	35625
Peel	79	1185	13	.....	.....	29111	35095
York	139	1390	85	6	1	59832	76300
Ontario	549	9882	59	10	.....	41326	52552
Durham	329	8883	24	6	.....	33989	38844
Northumberland	714	10710	48	194	.....	38215	42925
Prince Edward	497	10934	8	281	.....	21335	22069
Totals	2681	48594	247	592	2	326804	394199

BEANS, FLAX, HAY, ROOTS, ETC.

under Beans, Meadow and Clover, Potatoes, Mangold Wurzels, Carrots and Turnips Crop; also the Acreage under Flax, Hops and Tobacco.

Potatoes.		Mangold Wurzels.		Carrots.		Turnips.		
Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	COUNTIES.
								Lake Erie Counties:
2474	316880	103	56650	24	7200	200	79400	Essex.
3400	656200	233	72230	103	25750	253	97851	Kent.
3165	300675	188	70500	125	31250	358	143200	Elgin.
3862	696060	104	36400	84	21000	558	279000	Norfolk.
1531	168410	89	19580	44	7040	63	13230	Haldimand.
2723	239514	161	46690	73	20005	183	83070	Welland.
17155	2377739	878	302050	453	112245	1615	695751	Totals.
								Lake Huron Counties:
3150	315000	384	153600	171	51300	341	119350	Lambton.
5215	834400	1145	651650	525	237250	5498	2529080	Huron.
5042	403360	491	225860	315	126000	3915	1624725	Bruce.
13407	1552760	2020	1031110	1011	414550	9754	4273155	Totals.
								Georgian Bay Counties:
7536	828960	396	198000	515	158650	7000	2870000	Grey.
6535	588150	535	240750	499	212070	2213	962625	Simcoe.
14071	1417110	931	438750	1014	370720	9213	3832625	Totals.
								West Midland Counties:
6562	753060	930	418500	384	144000	1646	691320	Middlesex.
3660	512400	856	599200	344	199520	4417	2650200	Oxford.
2337	186960	205	92250	226	113000	1648	971840	Brant.
4225	507000	1269	653535	497	236075	4225	2028000	Perth.
5804	725500	786	471600	261	125280	11149	6243440	Wellington.
3114	404820	511	370475	336	218400	4822	2700320	Waterloo.
2724	367740	77	38500	129	51600	1836	918000	Dufferin.
28426	3457480	4634	2644060	2177	1087875	29743	16203120	Totals.
								Lake Ontario Counties
1888	141600	134	56280	104	37440	144	54020	Lincoln.
3602	432240	398	212930	223	89200	1612	765700	Wentworth.
1768	121000	345	167325	129	56760	1125	675000	Halton.
2628	249660	422	232100	395	207375	976	468480	Peel.
8152	652160	1770	858450	927	441075	2461	935180	York.
3964	376580	1042	312600	542	99850	8961	2464275	Ontario.
3147	503520	469	248570	521	221240	3746	1788350	Durham.
3797	341730	352	197120	234	105300	1945	447350	Northumberland.
2489	124950	94	4700	40	3000	137	13700	Prince Edward.
31435	2943440	5026	2290075	3115	1256240	21107	7612055	Totals.

BEANS, FLAX, HAY, ROOTS, ETC.

TABLE No. II.—Showing by County Municipalities and Groups of Counties the Acreage in Ontario in 1882, and the Produce of each kind of

COUNTIES.	Beans.		Flax.	Hops.	To-bacco.	Hay and Clover.	
	Acres.	Bushels.	Acres.	Acres.	Acres.	Acres.	Tons.
St. Lawrence and Ottawa Counties:							
Lennox and Addington	270	5400	10	24	.....	33232	34488
Frontenac	456	13224	8	.....	.....	55556	58183
Leeds and Grenville	430	7740	50	447	.....	93048	100227
Dundas	188	5640	68	3	.....	27876	35629
Stormont	107	3210	45	17	.....	28247	35010
Glengarry	118	3540	2	25	.....	32439	40407
Prescott	712	29904	43	6	.....	22158	25104
Russell	195	4290	105	28	.....	13108	14968
Carleton	422	10128	28	5	.....	50264	57125
Renfrew	517	10857	79	44	.....	51849	44512
Lanark	360	10800	18	31	.....	49261	47489
Totals	3775	104733	456	630	.....	457038	493142
East Midland Counties:							
Victoria	133	2394	91	25	.....	28103	31156
Peterborough	130	2730	17	20	.....	30689	31833
Haliburton	23	460	12	6	.....	9162	8493
Hastings	363	7260	28	6	.....	55404	58009
Totals	649	12844	148	57	.....	123358	129491
Northern Districts:							
Algoma	4	52	2	.....	.....	6596	6927
Muskoka	44	572	11	.....	.....	12004	11751
Parry Sound	22	286	1	.....	.....	5953	6046
Totals	70	910	14	.....	.....	24553	24724

SUMMARY OF RETURNS

Lake Erie Counties	10210	195218	344	121	28	221207	266196
Lake Huron Counties	366	7011	1336	300	.....	172717	190430
Georgian Bay Counties	218	2992	223	65	.....	153995	163524
West Midland Counties	1818	37608	3389	286	21	346218	428920
Lake Ontario Counties	2681	48594	247	592	2	326804	394199
St. Lawrence and Ottawa Counties	3775	104733	456	630	.....	457038	493142
East Midland Counties	649	12844	148	57	.....	123358	129491
Northern Districts	70	910	14	.....	.....	24553	24724
Totals	19787	409910	6157	2051	51	1825890	2090626

BEANS, FLAX, HAY, ROOTS, ETC.

under Beans, Meadow and Clover, Potatoes, Mangold Wurzels, Carrots and Turnips Crop; also the Acreage under Flax, Hops and Tobacco.—*Continued.*

Potatoes.		Mangold Wurzels.		Carrots.		Turnips.		COUNTIES.
Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	
								St. Lawrence and Ottawa Counties:
3682	460250	40	8000	52	22360	150	45000	Lennox and Addington.
5013	501300	150	54750	153	35955	267	69420	Frontenac.
7560	680400	141	69090	117	46800	291	93120	Leeds and Grenville.
2647	381613	97	54805	51	25500	78	21860	Dundas.
2352	376320	39	22055	15	7500	37	8880	Stormont.
2749	192430	76	15200	27	4050	13	1950	Glengarry.
2505	105210	55	27500	47	10105	58	21750	Prescott.
1408	140800	52	9100	77	21175	143	35750	Russell.
6217	795776	595	243950	594	228690	1235	481650	Carleton.
3512	649720	75	37500	99	43065	218	97010	Renfrew.
3485	540175	152	86640	161	81305	265	111300	Lanark.
41130	4823994	1472	628590	1393	526505	2755	987690	Totals.
								East Midland Counties:
2844	364032	394	236400	266	83790	2312	1051960	Victoria.
2466	283590	235	84600	343	109760	740	259000	Peterborough.
90	121500	8	3360	6	1740	306	61200	Haliburton.
6750	742500	157	47100	130	32500	498	82170	Hastings.
12960	1511622	794	371460	745	227790	3856	1454330	Totals.
								Northern Districts:
540	126900	14	1750	6	1200	194	99910	Algoma.
1020	137700	11	1925	31	10850	383	139795	Muskoka.
556	83400	11	1650	10	2000	203	60900	Parry Sound.
2116	348000	36	5325	47	14050	780	300605	Totals.

BY COUNTY GROUPS.

17155	2377739	878	302050	453	112245	1615	695751	Lake Erie Counties.
13407	1552760	2020	1031110	1011	414550	9754	4273155	Lake Huron Counties.
14071	1417110	931	438750	1014	370720	9213	3832625	Georgian Bay Counties.
28426	3457480	4634	2644060	2177	1087875	29743	16203120	West Midland Counties.
31435	2943440	5026	2290075	3115	1256240	21107	7612055	Lake Ontario Counties.
41130	4823994	1472	628590	1393	526505	2755	987690	St. Lawrence and Ottawa Counties.
12960	1511622	794	371460	745	227790	3856	1454330	East Midland Counties.
2116	348000	36	5325	47	14050	780	300605	Northern Districts.
160700	18432145	15791	7711420	9955	4009975	78823	35359331	Totals.

LIVE STOCK.

TABLE No. III.—Showing by County Municipalities and Groups of Counties the Number and Poultry in Ontario, as returned for Farms

COUNTIES.	No. of Horses.			Thoroughbred Cattle.	Grade and Native Cattle.				Totals of Cattle.	
	Working Horses.	Breeding Mares.	Unbroken Horses.		Working Oxen.	Milch Cows.	Store Cattle over 2 years.	Other Cattle.	No. of Milch Cows of all Breeds.	No. of all Classes and Breeds.
Lake Erie Counties:										
Essex	7309	1791	2652	434	253	9680	4633	10292	9742	25292
Kent	9574	1990	2740	550	161	16960	8622	17656	17035	43949
Elgin	8695	1702	2542	498	277	17210	9730	18452	17281	46167
Norfolk	7448	1346	2221	724	348	13812	4016	11350	13990	30250
Haldimand	5787	1368	1900	490	75	10092	3815	9952	10185	24424
Welland	5625	932	1489	281	156	7545	2597	6554	7680	17133
Totals	44438	9129	13544	2977	1270	75299	33413	74256	75913	187215
Lake Huron Counties:										
Lambton	7518	1566	2397	660	35	15689	11145	20262	15787	47791
Huron	14162	3440	4882	983	497	26517	17504	36303	26666	81804
Bruce	10808	2317	3036	699	847	21998	11364	26405	22082	61313
Totals	32488	7323	10315	2342	1379	64204	40013	82970	64535	190908
Georgian Bay Counties:										
Grey	15212	3100	4004	678	2479	28432	16669	36078	28525	84336
Simcoe	13242	2981	3940	794	852	20814	10174	23092	20988	55726
Totals	28454	6081	7944	1472	3331	49246	26843	59170	49513	140062
West Midland Counties:										
Middlesex	15826	3568	4349	1468	96	33132	24340	37412	33368	96448
Oxford	10936	2306	3352	913	96	29834	10634	20756	30056	62233
Brant	5513	1141	1547	628	30	9198	3418	8585	9444	21859
Perth	10440	2403	3170	551	214	21960	10780	27225	22038	60730
Wellington	12516	2864	3486	1424	567	21599	13125	29466	21809	66181
Waterloo	7554	1630	2104	754	156	12495	4653	14247	12655	32305
Dufferin	4912	1006	1290	184	378	8427	4852	10707	8452	24548
Totals	67697	14918	19298	5922	1537	136645	71802	148398	137822	364304
Lake Ontario Counties:										
Lincoln	5276	1020	1440	340	92	7360	2458	6004	7433	16254
Wentworth	7426	1433	1853	486	247	11850	3378	10007	11934	25968
Halton	5318	970	1222	529	266	8408	4075	9073	8512	22351
Peel	6781	1499	2003	552	46	9752	4533	9288	9838	24171
York	14254	3582	4227	948	146	18931	6189	14191	19154	40405
Ontario	10545	2577	3208	847	149	14888	7191	19600	15037	42675
Durham	8646	1835	2492	639	99	12125	5706	13901	12216	32490
Northumberland	9515	1373	2070	538	292	14956	4842	11173	15029	31801
Prince Edward	5924	1034	1682	375	46	8507	1503	4295	8619	14726
Totals	73685	15323	20257	5274	1383	106777	39875	97532	107772	250841

LIVE STOCK.

of Horses, Thoroughbred, Grade and Native Cattle, Coarse and Fine-woolled Sheep, Pigs of five acres and upwards on 31st May, 1882.

Sheep.				Pigs.		Poultry.			
Coarse-Woolled.		Fine-Woolled.							
1 year and over.	Under 1 year.	1 year and over.	Under 1 year.	1 year and over.	Under 1 year.	No. of Turkeys.	No. of Geese.	No. of other Fowls.	COUNTIES.
									Lake Erie Counties :
11248	7503	1303	980	10368	26230	4825	14550	107645	Essex.
2 742	13484	3382	2343	10062	26000	10359	19858	126480	Kent.
26237	19002	3015	2178	7720	23282	6657	11972	111625	Elgin.
16955	13015	3810	2900	4917	19585	3943	9707	117790	Norfolk.
17255	12848	3474	2982	3377	12451	6445	8390	80687	Haldimand.
11059	7496	2666	2104	2582	10178	6415	6820	80026	Welland.
103496	73348	17740	13487	39026	117726	38624	71297	624253	Totals.
									Lake Huron Counties :
27408	21278	3957	3135	4636	12448	5358	11833	93246	Lambton.
46215	37108	7431	5646	9717	19552	8901	25500	210700	Huron.
39756	31620	7357	5972	8946	18742	5897	18628	154294	Bruce.
113379	90006	18745	14753	23299	50742	20156	55961	458240	Totals.
									Georgian Bay Counties :
54788	42651	11671	9100	13332	23667	9104	23233	199076	Grey.
35962	24624	5654	4020	13030	28025	11409	27252	169870	Simcoe.
90750	67275	17325	13120	26362	51692	20513	50485	368946	Totals.
									West Midland Counties :
47002	35480	5762	4372	10360	29096	18090	27286	229276	Middlesex.
26580	20488	2896	2132	6864	23816	7838	9900	143324	Oxford.
17352	12533	2637	1945	2931	12072	5814	5818	69574	Brant.
33945	28786	5974	4200	7475	16751	8148	21204	147883	Perth.
44992	32782	5432	3891	8060	23391	8048	20120	160684	Wellington.
22505	16378	3378	2721	2752	12184	1918	6112	100960	Waterloo.
14906	11119	2873	2001	4630	9831	4886	10552	66577	Dufferin.
207282	157566	28952	21262	43072	127141	54742	100992	918078	Totals.
									Lake Ontario Counties :
10044	6686	2356	1548	2586	9954	5254	5532	65518	Lincoln.
16205	11030	2169	1622	3387	15409	4767	8316	87103	Wentworth.
12703	8829	1355	1186	2382	10183	6930	9143	69425	Halton.
16686	11668	1635	1124	4046	13405	12095	16178	88588	Peel.
29810	18702	4156	3193	7117	28426	11095	21177	166313	York.
25963	16887	4229	3123	7452	18700	7391	16389	145393	Ontario.
20923	14356	2855	1823	6116	13452	11720	18764	104760	Durham.
19608	13670	3144	2325	6230	13468	7404	12713	113374	Northumberland.
9358	6561	3301	2244	2151	4697	2462	6547	73750	Prince Edward.
161300	108389	25300	18188	41467	125694	69118	114359	915224	Totals.

LIVE STOCK.

TABLE No. III.—Showing by County Municipalities and Groups of Counties the Number and Poultry in Ontario, as returned for Farms

COUNTIES.	No. of Horses.			Thoroughbred Cattle.	Grade and Native Cattle.				Totals of Cattle.	
	Working Horses.	Breeding Mares.	Unbroken Horses.		Working Oxen.	Milch Cows.	Store Cattle over 2 years.	Other Cattle.	No. of Milch Cows of all breeds.	No. of all Classes and Breeds.
St. Lawrence and Ottawa Counties:										
Lennox and Addington	6808	986	1776	326	454	12042	4071	7524	12086	24417
Frontenac	6428	1176	1828	335	476	15380	4763	11220	15456	32174
Leeds and Grenville	10755	1852	2765	908	92	38000	7978	14994	38116	61972
Dundas	4518	824	1220	452	15	13304	2637	5284	13359	21692
Stormont	4035	762	1287	447	10	12915	1562	5530	13057	20464
Glengarry	4992	1323	1674	501	8	17218	2157	7405	17321	27289
Prescott	4000	1152	1287	329	37	9361	1939	5733	9431	17399
Russell	2171	765	729	161	26	5144	1462	3602	5150	10395
Carleton	7766	1657	2052	321	34	18380	5471	13537	18427	37743
Renfrew	5964	1004	1199	183	216	14591	5569	13744	14623	34303
Lanark	5617	1140	1516	287	149	15833	5280	13993	15876	35542
Totals	63054	12641	17333	4250	1517	172168	42889	102566	172902	323390
East Midland Counties:										
Victoria	7241	1741	1971	306	282	11568	4515	12327	11591	28998
Peterborough	6216	1107	1861	427	294	11165	4207	10917	11196	27010
Haliburton	701	116	152	29	479	2265	834	2715	2266	6322
Hastings	11087	1803	3007	496	1638	31082	6080	13756	31135	53052
Totals	25245	4767	6991	1258	2693	56080	15636	39715	56188	115382
Northern Districts:										
Algoma	649	139	133	26	414	1305	379	1497	1312	3621
Muskoka	917	200	195	68	664	2604	992	3028	2605	7356
Parry Sound	305	75	66	40	378	1054	366	1395	1067	3233
Totals	1871	414	394	134	1456	4963	1737	5920	4984	14210

SUMMARY OF RETURNS

Lake Erie Counties	44438	9129	13544	2977	1270	75299	33413	74256	75913	187215
Lake Huron Counties	32488	7323	10315	2342	1379	64204	40013	82970	64535	190908
Georgian Bay Counties	28454	6081	7944	1472	3331	49246	26843	59170	49513	140062
West Midland Counties	67697	14918	19298	5922	1537	136645	71802	148398	137822	364304
Lake Ontario Counties	73685	15323	20257	5274	1353	106777	39875	97532	107772	250841
St. Lawrence and Ottawa Counties	63054	12641	17333	4250	1517	172168	42889	102566	172902	323390
East Midland Counties	25245	4767	6991	1258	2693	56080	15636	39715	56188	115382
Northern Districts	1871	414	394	134	1456	4963	1737	5920	4984	14210
Totals	336932	70596	96076	23629	14566	665382	272208	610527	669629	1586312

LIVE STOCK.

of Horses, Thoroughbred, Grade and Native Cattle, Coarse and Fine-woolled Sheep, Pigs of five acres and upwards on 31st May, 1882.—*Continued.*

Sheep.				Pigs.		Poultry.			Counties.
Coarse-Woolled.		Fine-Woolled.							
1 year and over.	Under 1 year.	1 year and over.	Under 1 year.	1 year and over.	Under 1 year.	No. of Turkeys.	No. of Geese.	No. of other Fowls.	
									St. Lawrence and Ottawa Counties :
14376	10934	3528	2192	3068	5960	2848	7028	76946	Lennox and Addington.
20157	14516	4749	3412	3769	6491	6313	9183	72063	Frontenac.
33601	25071	10166	7699	8805	14261	22550	17412	146162	Leeds and Grenville.
9460	6125	3720	2432	3595	5807	3300	5361	82260	Dundas.
8477	5400	2997	1882	3412	4895	1932	5140	76902	Stormont.
15664	8312	4847	2119	4677	5124	2190	6586	73662	Glengarry.
8655	5957	2989	2109	4697	5367	4250	3421	48058	Prescott.
5445	3705	1861	1365	2690	3024	2388	2160	28047	Russell.
27834	22595	5977	4850	7843	13267	17094	17881	122779	Carleton.
24125	14521	8583	5213	8440	7301	6160	9116	67322	Renfrew.
20173	20464	3607	2109	4789	7944	14796	9504	76055	Lanark.
196967	137600	53024	35382	55785	79441	83821	92792	870256	Totals.
									East Midland Counties :
17689	12430	3980	2433	6249	11904	6664	13239	85103	Victoria.
15498	11305	2318	1644	5743	11508	6883	12542	79972	Peterborough.
2170	1340	924	781	815	1372	580	1310	11917	Haliburton.
20635	14320	8505	5493	8948	14488	6809	17500	142692	Hastings.
55992	39395	15727	10351	21755	39272	20936	44591	319684	Totals.
									Northern Districts :
887	749	251	166	589	1201	463	703	8100	Algoma.
2810	1848	754	574	725	1772	905	1400	17746	Muskoka.
280	186	581	216	335	1130	780	777	8178	Parry Sound.
3977	2783	1586	956	1649	4103	2148	2880	34024	Totals.

BY COUNTY GROUPS.

103496	73348	17740	13487	39026	117726	38624	71297	624253	Lake Erie Counties.
113379	90006	18745	14753	23299	50742	20156	55951	458240	Lake Huron Counties.
90750	67275	17325	13120	26362	51692	20513	50485	368946	Georgian Bay Counties.
207282	157566	28952	21262	43072	127141	54742	100992	918078	West Midland Counties.
161300	108389	25300	18188	41467	125694	69118	114359	915224	Lake Ontario Counties.
196967	137600	53024	35382	55785	79441	83821	92792	870256	St. Lawrence and Ottawa Counties.
55992	39395	15727	10351	21755	39272	20936	44591	319684	East Midland Counties.
3977	2783	1586	956	1649	4103	2148	2880	34024	Northern Districts.
933143	676362	178299	127499	252415	597811	310058	533357	4508705	Totals.

THOROUGHBRED CATTLE.

TABLE No. IV.—Showing by County Municipalities the Number of each class of Thoroughbred Cattle in Ontario, as returned 31st May, 1882.

COUNTIES.	Thoroughbred Cattle.						
	Durham.	Devon.	Hereford.	Aberdeen Poll.	Galloway.	Ayrshire.	Totals.
Essex	246	34	33	25	17	79	434
Kent	391	32	41	1	37	48	550
Elgin	321	67	13	19	24	54	498
Norfolk	433	60	46	5	50	130	724
Haldimand	394	23	16	.....	46	11	490
Welland	190	37	9	3	14	28	281
Lambton	488	71	8	5	34	54	660
Huron	688	60	36	23	40	136	983
Bruce	496	33	32	8	41	89	699
Grey	507	42	35	6	51	37	678
Simcoe	587	51	28	7	54	67	794
Middlesex	1111	151	50	14	65	77	1468
Oxford	648	51	19	5	24	166	913
Brant	591	8	3	.....	10	16	628
Perth	433	30	7	10	23	48	551
Wellington	1125	36	125	9	77	52	1424
Waterloo	670	13	18	6	5	42	754
Dufferin	139	8	7	9	12	9	184
Lincoln	272	24	5	.....	34	5	340
Wentworth	316	30	10	2	9	119	486
Halton	429	37	1	1	12	49	529
Peel	462	36	11	.....	23	20	552
York	741	27	22	4	27	127	948
Ontario	767	33	6	.....	24	17	847
Durham	457	52	21	6	35	88	659
Northumberland	328	45	12	4	28	121	538
Prince Edward	142	13	14	1	32	173	375
Lennox and Addington	151	29	2	2	25	117	326
Frontenac	158	7	10	6	31	123	335
Leeds and Grenville	283	18	17	7	32	545	908
Dundas	106	17	22	5	39	263	452
Stormont	85	23	8	9	15	307	447
Glengarry	133	26	40	6	3	293	501
Prescott	89	5	25	5	3	202	329
Russell	69	5	2	4	2	79	161
Carleton	127	16	11	2	26	139	321
Renfrew	70	9	1	.....	10	93	183
Lanark	109	2	5	10	21	140	287
Victoria	193	55	13	2	12	31	306
Peterborough	173	46	37	2	83	86	427
Haliburton	15	3	.....	2	4	5	29
Hastings	176	48	16	27	27	202	496
Algoma	17	1	1	.....	2	5	26
Muskoka	38	20	3	1	4	2	68
Parry Sound	25	4	.....	7	2	2	40
Totals	15385	1438	841	270	1189	4496	23619

WOOL, MAPLE SUGAR AND FRUIT.

TABLE No. V.—Showing by County Municipalities the clip of Coarse and Fine Wools, the production of Maple Sugar, and the Acreage under Orchard, Garden and Vineyard in Ontario in 1882.

COUNTIES.	Wool.				Maple Sugar.	Acreage of Fruit.	
	Coarse Wool.		Fine Wool.				
	No. of Fleeces.	Pounds.	No. of Fleeces.	Pounds.	Pounds made this year.	Orchard and Garden.	Vineyard.
Essex	11248	58114	1393	7006	27637	6399	130
Kent	20742	112006	3382	18939	74751	7849	109
Elgin	26237	147578	3015	16381	464080	7640	30
Norfolk	16955	85622	3810	17907	135968	8770	92
Haldimand	17255	96973	3474	15702	62848	4891	86
Welland	11059	55295	2666	12440	7540	7151	275
Lambton	27408	153484	3957	20872	75100	6490	29
Huron	46215	256493	7431	39078	56102	8775	47
Bruce	39756	210606	7357	38503	73157	6213	66
Grey	54788	291471	11671	61039	88541	8262	33
Simcoe	35962	160389	5654	29965	171711	6085	20
Middlesex	47002	270262	5762	31691	141137	12242	104
Oxford	26580	152835	2896	14913	174313	9142	36
Brant	17352	96130	2637	13975	101575	5213	32
Perth	33945	179908	5974	31064	30972	5643	29
Wellington	44992	228108	5432	29386	50342	5790	11
Waterloo	22505	123750	3378	16314	62065	5191	37
Dufferin	14906	80490	2873	15656	29196	1766	3
Lincoln	10044	50220	2356	11074	61519	7878	158
Wentworth	16205	83725	2169	11205	13309	8134	225
Halton	12703	76218	1355	7283	4226	5332	40
Peel	16686	108459	1635	8265	9902	4556	64
York	29810	166041	4156	24521	39495	8881	65
Ontario	25963	147123	4229	25627	26583	5734	11
Durham	20923	111100	2855	16179	15879	4898	37
Northumberland	19608	105096	3141	16034	154096	6203	69
Prince Edward	9358	55689	3301	16093	132128	6943	22
Lennox and Addington	14376	70443	3528	17394	121516	3535	17
Frontenac	20157	91512	4749	23032	127309	3148	13
Leeds and Grenville	33601	154900	10166	50830	819812	4412	55
Dundas	9460	44935	3720	17558	12534	1212	.....
Stormont	8477	40431	2997	14685	226786	1400	2
Glengarry	15664	67040	4847	22620	216454	983	10
Prescott	8655	37505	2989	14945	47672	576	16
Russell	5445	23413	1861	10383	17700	322	6
Carleton	27834	128870	5977	28807	29854	1391	20
Renfrew	24125	97465	8583	36477	46398	738	1
Lanark	29173	127630	3607	16014	349237	1311	9
Victoria	17689	89329	3980	21532	93439	2279	18
Peterborough	15498	79348	2318	11540	53387	2352	6
Haliburton	2170	10035	924	4213	54808	190	.....
Hastings	20635	95332	8505	37762	506569	7464	59
Algoma	887	4984	251	1255	4392	99	2
Muskoka	2810	14050	754	4304	46190	317	4
Parry Sound	280	1680	581	3544	15381	46	.....
Totals	933143	4842078	178299	904107	5073610	213846	2098

FARM ACREAGE AND VALUES.

TABLE No. VI.—Showing by County Municipalities the Number and Acreage of Farms and the Value of Farm Property in Ontario in 1882.

COUNTIES.	No. and Acreage of Farms.			Value of Farm Property.				
	No. of Farms.	Acres Occupied.	Acres Cleared.	Farm Land.	Buildings.	Implements.	Live Stock.	Total.
				$	$	$	$	$
Essex	5538	403074	154911	15288010	2367850	663305	1427925	19747090
Kent	6743	532103	232980	23256100	3639915	1009180	2134025	30039220
Elgin	5302	422511	245938	18456265	3755530	994265	2306425	25512485
Norfolk	4647	360329	209844	12803820	3285880	789110	1472010	18350820
Haldimand	3149	280613	185147	9712785	2683125	707870	1385730	14489510
Welland	2739	220403	150283	8448660	2535275	627585	1107830	12719350
Lambton	6145	568206	220961	22153720	2944440	953325	2158195	28209680
Huron	8558	738963	446442	30939580	5596670	1797635	3979630	42313515
Bruce	8067	722514	357503	26446190	3942180	1206925	2613495	34208790
Grey	10214	983696	514448	23348310	4845580	1611940	3813945	33628775
Simcoe	9114	819736	408757	26238510	4538400	1481840	3028355	35287105
Middlesex	8562	742834	468360	30346495	7496890	2258520	4836900	53938805
Oxford	5142	466252	324422	22702760	5449635	1414475	3093545	32660415
Brant	2126	213952	163682	10322700	2983430	702800	1207580	15216510
Perth	5375	491661	318034	21825175	4836415	1389720	3211325	31262635
Wellington	6165	637846	392000	21114615	4724770	1463915	3323550	30626850
Waterloo	2885	303305	221378	14136955	3884610	915665	1767000	20704230
Dufferin	2963	307758	154010	8592790	1380835	509860	1139295	11622780
Lincoln	2735	188732	137792	8182425	2523110	684315	1089550	12479400
Wentworth	3200	267853	199369	13450880	3810620	865730	1698015	19825245
Halton	1915	218661	164055	8768410	2544320	631270	1325930	13269930
Peel	2884	288055	215383	12951150	3141735	844725	1573710	18511320
York	5426	528061	392143	28628270	6864245	1628980	3254610	40376085
Ontario	5677	472070	321131	20939285	4260330	1046090	2560235	28805940
Durham	3577	362318	269142	16275525	3626150	937635	1993050	22832360
Northumberland	5328	430062	287989	15220860	3351320	894265	1847160	21313605
Prince Edward	3313	229504	162135	8934695	2087300	537030	928265	12487290
Lennox and Addington	3779	406962	197078	11999930	2400600	610585	1247685	16258800
Frontenac	4562	575730	217364	9968400	2219450	636955	1443990	14268795
Leeds and Grenville	8250	748790	383909	18038675	4289815	1060305	2760240	26149035
Dundas	2631	223402	113570	7611530	1546520	416820	873315	10448185
Stormont	2652	247393	107424	5900815	1473845	383955	866790	8625405
Glengarry	2646	286929	133892	6030015	1415195	423105	1046180	8914495
Prescott	3086	243808	105197	5302100	995775	328660	712240	7338775
Russell	2072	193811	51726	3841900	509230	178735	463465	4993330
Carleton	4686	545900	248717	13637000	2819790	864160	1846025	19166975
Renfrew	5156	746857	203731	5627540	1368195	418075	1409180	8822990
Lanark	4321	623061	255758	6198155	1605255	458245	1385215	9646870
Victoria	4351	467456	215477	15050975	2268720	722680	1604570	19646945
Peterborough	3569	443971	189628	11890500	1963265	564910	1338980	15757655
Haliburton	1403	171230	25266	481590	154240	43245	192385	871460
Hastings	6290	808097	356976	18297365	3809765	1112955	2401300	25621385
Algoma	2030	184760	47254	1606160	315605	118055	287055	2326875
Muskoka	2319	372150	32458	1875655	339840	91730	272195	2579420
Parry Sound	666	131054	14967	499275	106910	28665	112625	747475
Totals	201898	19622429	10218631	632342500	132712575	37029815	80540720	882625610

RENT AND WAGES.

TABLE No. VII.—Showing by County Municipalities the average Rent of Farm Land per Acre, and the average Wages of Farm and Domestic Servants in 1882.

COUNTIES.	Leased Farms.	Wages of Farm Hands and Domestics.						
		Farm Hands.						Domestics.
	Rent per Acre.	Per Year with Board.	Per Year without Board.	Per Month with Board.	Per Month without Board.	Per Day with Board.	Per Day without Board.	Per Week with Board.
	$ c.	$	$	$	$	$ c.	$ c.	$ c.
Essex	2 80	176	245	17	25	1 12	1 38	1 60
Kent	4 00	188	282	18	25	1 00	1 25	1 50
Elgin	3 50	163	240	16	26	0 90	1 12	1 60
Norfolk	3 00	165	255	16	23	0 90	1 18	1 55
Haldimand	2 10	144	215	16	25	1 00	1 30	1 38
Welland	2 75	150	....	16	....	1 00	....	1 25
Lambton	3 00	170	266	16	24	0 95	1 25	1 60
Huron	2 50	168	252	16	25	0 85	1 10	1 50
Bruce	2 37	160	245	18	25	0 90	1 10	1 45
Grey	2 15	160	215	16	23	0 87	1 05	1 30
Simcoe	2 90	165	260	18	28	0 95	1 16	1 50
Middlesex	3 50	175	230	17	22	1 00	1 15	1 60
Oxford	3 00	160	230	16	20	1 00	....	1 65
Brant	3 30	170	240	17	....	1 00	....	1 65
Perth	3 00	165	...	20	....	1 12	1 50	1 63
Wellington	3 00	164	248	17	25	0 90	1 20	1 55
Waterloo	3 00	160	245	17	22	0 87	1 20	1 63
Dufferin	2 30	145	225	17	....	0 90	....	1 35
Lincoln	3 00	157	232	17	22	0 95	1 25	1 60
Wentworth	3 20	145	254	16	24	0 95	1 40	1 50
Halton	2 80	175	267	18	27	0 95	1 35	1 70
Peel	3 55	170	270	19	30	1 00	1 25	1 80
York	3 80	166	252	17	24	0 95	1 25	1 50
Ontario	2 85	170	380	19	30	1 00	1 60	1 40
Durham	4 25	164	243	16	20	0 90	1 25	1 50
Northumberland	3 25	150	300	15	21	0 91	1 00	1 55
Prince Edward	3 37	144	200	14	20	1 05	1 25	1 30
Lennox and Addington	2 40	158	240	15	25	1 00	1 30	1 90
Frontenac	1 95	146	229	16	23	0 90	1 10	1 35
Leeds and Grenville	1 80	175	250	17	23	0 90	1 30	1 45
Dundas	2 80	155	....	15	....	0 77	1 00	1 65
Stormont	2 00	200	....	20	....	1 00	....	1 35
Glengarry	2 50	235	....	20	....	0 95	1 25	1 70
Prescott	2 00	172	300	15	....	1 00	....	1 65
Russell	1 70	197	....	18	22	0 88	1 25	1 25
Carleton	2 70	152	240	15	26	1 10	1 25	1 50
Renfrew	1 40	168	296	18	28	0 97	1 40	1 50
Lanark	1 50	176	250	18	23	1 00	1 25	1 62
Victoria	3 15	170	265	19	28	1 00	1 25	1 75
Peterborough	2 45	183	280	20	23	0 95	1 00	1 45
Haliburton	....	...	....	18	...	0 90	1 12	1 37
Hastings	2 30	160	252	18	22	0 90	1 18	1 40
Algoma	....	110	240	20	30	1 50	...	1 45
Muskoka	....	185	312	20	30	1 00	1 35	1 60
Parry Sound	....	....	....	20	....	0 90	...	1 40

AVERAGE PRODUCTION.

TABLE No. VIII.—Showing by County Municipalities and for Groups of Counties and the Province the Average Production of Field Crops per Acre in 1882.

COUNTIES.	Fall Wheat, bush.	Spring Wheat, bush.	Barley, bush.	Oats, bush.	Rye, bush.	Peas, bush.	Corn, bush. in ear.	Buckwheat, bush.	Beans, bush.	Potatoes, bush.	Mangolds, bush.	Carrots, bush.	Turnips, bush.	Hay & Clover, Tons.
Essex	23	16	29	33	20	22	80	20	19	120	550	300	200	1.34
Kent	26	15	30	42	28	23	83	21	19	193	310	250	387	1.38
Elgin	28	18	29	37	21	18	77	22	20	95	375	250	400	1.25
Norfolk	26	14	29	32	19	22	67	22	23	180	350	250	500	1.19
Haldimand	21	12	20	33	20	16	54	26	17	110	220	160	210	1.08
Welland	16	15	19	26	16	10	38	15	14	88	290	285	290	1.07
Lambton	24	13	23	32	20	18	52	20	19	100	400	300	350	1.19
Huron	29	13	31	38	20	22	52	17	19	160	570	450	460	1.09
Bruce	30	13	30	35	20	22	50	12	20	80	460	400	415	1.05
Grey	30	15	28	37	20	20	52	20	16	110	660	310	410	0.99
Simcoe	31	16	28	34	24	20	55	17	8	90	450	425	435	1.16
Middlesex	27	18	27	36	20	19	70	18	19	130	450	375	420	1.30
Oxford	25	15	32	37	15	22	63	20	40	140	700	580	600	1.30
Brant	26	16	31	40	15	17	77	25	16	80	450	500	580	1.13
Perth	28	14	31	43	18	22	75	17	20	120	515	475	480	1.25
Wellington	27	15	30	40	21	24	50	20	20	125	600	480	560	1.21
Waterloo	30	17	32	40	20	22	75	20	20	130	725	650	560	1.18
Dufferin	30	14	25	32	20	17	53	16	20	135	500	400	500	1.14
Lincoln	26	15	30	37	15	16	55	40	15	75	420	360	375	1.15
Wentworth	23	12	30	39	22	19	81	27	15	120	535	400	475	1 28
Halton	20	17	32	39	17	21	60	22	15	125	485	440	600	1.24
Peel	25	17	35	40	22	20	50	15	15	95	550	525	480	1.21
York	27	18	31	43	18	20	62	20	10	80	485	465	380	1.27
Ontario	30	17	30	32	21	17	64	22	18	95	300	175	275	1.27
Durham	27	20	32	41	18	20	66	27	27	160	530	440	475	1.11
Northumberland	27	17	29	32	15	14	58	22	15	90	560	550	430	1.12
Prince Edward	14	12	21	26	13	11	42	12	22	50	50	75	100	1.03
Lennox and Addington	19	21	27	36	15	21	45	36	20	125	200	430	300	1.03
Frontenac	21	19	30	34	20	20	50	28	29	100	365	235	260	1.05
Leeds and Grenville	19	18	27	33	20	20	52	28	18	90	490	400	320	1.08
Dundas	19	16	36	40	27	22	57	32	30	145	565	500	280	1.28
Stormont	18	16	29	37	20	20	50	25	30	160	565	500	240	1.24
Glengarry	15	14	22	35	10	17	30	31	30	70	200	150	150	1.24
Prescott	10	12	18	23	10	9	28	14	42	42	500	215	325	1.13
Russell	20	16	22	33	17	20	40	30	22	100	175	275	250	1.14
Carleton	14	14	30	41	20	21	42	23	24	128	410	385	390	1.14
Renfrew	16	18	30	40	23	20	65	24	21	185	500	435	445	0.86
Lanark	18	19	29	42	21	26	42	33	30	155	570	505	420	0.96
Victoria	26	18	27	36	18	20	70	20	18	128	600	315	455	1.11
Peterborough	27	13	29	34	18	20	53	20	21	115	360	320	350	1.04
Haliburton	16	11	20	20	17	15	49	10	20	135	420	290	200	0.93
Hastings	19	20	27	30	18	16	47	35	20	110	300	250	165	1.05
Algoma	25	26	29	40	15	30	30	30	13	235	125	200	515	1.05
Muskoka	16	18	24	35	30	22	30	30	13	135	175	350	365	0.98
Parry Sound	20	16	26	36	20	20	30	30	13	150	150	200	300	1.02
Averages for the														
Lake Erie Counties	24.1	11.5	24.4	34.4	19.4	18.3	73.4	20.8	19.1	139	344	248	431	1.20
Lake Huron Counties	28.3	13	28.4	35.6	20	21.7	51.9	16.8	19.2	116	510	410	438	1.10
Georgian Bay Counties	30.6	15.4	28	35.8	23.7	20	54.1	18.3	13.7	101	471	366	416	1.06
West Midland Counties	27.3	14.8	30.1	38.4	17.9	21.4	69.3	21.2	20.7	122	571	500	545	1.24
Lake Ontario Counties	25.	17.7	29.6	37.7	16.8	18.1	58.3	20.3	18.1	94	456	403	361	1.21
St. Lawrence and Ottawa Counties	17.8	16.6	28.4	36.4	20.1	19.1	46.5	28.2	27.7	117	427	378	359	1.08
East Midland Counties	23.7	16.5	26.2	32.4	18	18.3	48.6	29.9	19.8	117	468	306	377	1.05
Northern Districts	23.7	24.1	26.5	36.2	23.9	25.5	30	30	13	164	148	299	385	1.01
Averages for the Province	26.3	16.5	28.6	36.4	18.8	19.6	64.9	25.2	20.7	115	488	403	448	1.14

TABLE No. IX.—Showing the average prices of Agricultural and Animal products at the leading Markets of Ontario for each month of 1882, together with the Live Stock Markets of Toronto and Montreal; also half-yearly and yearly averages for each Market, and for the whole Province.

MARKETS.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	1st half-year.	2nd half-year.	Year.
TORONTO PRODUCE MARKET.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Flour, Sup. Extra.....per bbl.	5 77	5 61	5 57	5 96	5 93	5 86	5 82	5 48	5 17	4 77	4 55	4 42	5 78	5 10	5 42
" Extra ..... "	5 63	5 52	5 47	5 81	5 82	5 73	5 72	5 52	5 06	4 69	4 48	4 37	5 66	4 93	5 37
Fall Wheat.....per bush.	1 22	1 26	1 26	1 31	1 32	1 28	1 24	1 14	1 05	0 99	0 94	0 91	1 27	1 05	1 16
Spring Wheat..... "	1 31	1 29	1 27	1 34	1 35	1 34	1 30	1 19	1 13	1 01	0 98	0 93	1 32	1 11	1 22
Barley ..... "	0 87	0 83	0 85	0 88	0 89	0 85	.....	0 72	0 68	0 70	0 62	0 63	0 86	0 70	0 80
Oats ..... "	0 41	0 41	0 41	0 45	0 47	0 48	0 49	0 57	0 46	0 41	0 40	0 38	0 44	0 46	0 45
Peas ..... "	0 79	0 79	0 79	0 83	0 86	0 86	0 87	0 89	0 81	0 75	0 74	0 73	0 82	0 79	0 80
Rye ..... "	0 85	0 82	0 81	0 83	0 79	0 78	.....	0 66	0 65	0 64	0 60	0 60	0 82	0 75	0 78
Potatoes .....per bag	0 99	1 05	1 07	1 10	1 28	1 46	1 54	1 19	0 96	0 60	0 64	0 69	1 16	0 89	1 03
Apples.....per bbl.	3 19	3 12	3 15	4 16	4 42	5 25	5 63	2 93	1 88	2 01	2 67	3 13	3 88	2 90	3 35
Hogs.....per cwt.	7 93	8 57	8 19	8 61	9 75	9 82	10 06	9 10	9 25	8 44	7 92	7 62	8 57	3 30	8 41
Butter .....per lb.	0 18	0 20	0 19	0 20	0 16	0 16	0 18	0 19	0 19	0 17	0 17	0 17	0 18	0 18	0 18
Eggs .....per doz.	0 20	0 21	0 15	0 15	0 15	0 16	0 18	0 17	0 18	0 21	.....	0 25	0 17	0 19	0 17
Wool (coarse) ..... per lb.	.....	.....	.....	.....	.....	0 20	0 20	0 21	0 20	0 20	0 20	0 20	0 20	0 20	0 20
" (fine) ..... "	.....	.....	.....	.....	.....	.....	.....	0 33	0 33	.....	0 31	0 30	.....	0 32	0 32
TORONTO STREET MARKET.															
Fall Wheat.....per bush.	1 25	1 23	1 21	1 28	1 29	1 25	1 21	1 15	1 05	0 98	0 93	0 91	1 25	1 04	1 14
Spring Wheat ..... "	1 31	1 27	1 25	1 32	1 34	1 30	1 29	1 22	1 16	1 06	1 05	0 96	1 30	1 12	1 21
Barley ..... "	0 83	0 79	0 81	0 87	0 87	0 69	0 64	0 65	0 69	0 69	0 65	0 60	0 81	0 66	0 74
Oats..... "	0 44	0 43	0 44	0 46	0 50	0 49	0 51	0 52	0 50	0 46	0 42	0 41	0 46	0 47	0 47
Peas..... "	0 77	0 79	0 80	0 81	0 84	0 84	0 82	0 82	0 80	0 76	0 72	0 72	0 81	0 78	0 79
Rye ..... "	0 85	0 84	0 81	0 81	0 83	0 77	0 71	0 66	0 63	0 62	0 62	0 60	0 82	0 63	0 74
Potatoes.....per bag	1 01	1 14	1 17	1 27	1 43	1 74	1 70	1 18	0 79	0 77	0 78	0 78	1 30	0 96	1 14
Apples .....per bbl.	1 86	2 25	2 31	3 78	4 00	4 00	4 00	2 89	1 59	1 78	1 83	2 67	2 96	2 39	2 68
Hay.....per ton	10 65	10 89	10 85	11 60	13 21	13 94	13 80	13 33	13 55	14 00	14 43	13 32	11 88	13 80	12 84
Hogs .....per cwt.	8 08	8 65	8 15	8 71	9 69	9 85	9 95	9 34	9 38	8 69	8 40	7 62	8 86	8 92	8 89
Butter (roll).....per lb.	0 24	0 25	0 25	0 26	0 19	0 19	0 21	0 25	0 23	0 23	0 22	0 24	0 23	0 23	0 23
" (dairy) ..... "	0 19	0 20	0 21	0 21	0 16	0 16	0 17	0 19	0 18	0 20	0 19	0 19	0 19	0 19	0 19
Wool ..... "	0 23	0 24	0 24	0 24	0 22	0 20	0 19	0 19	0 19	0 19	0 19	0 19	0 22	0 19	0 21
Beef (hind-quarters).....per cwt.	6 51	7 12	8 17	8 75	9 13	11 44	9 90	8 25	8 25	8 06	7 25	7 25	8 55	8 17	8 36
" (fore-quarters)..... "	5 19	5 43	6 28	6 75	7 30	9 34	7 96	6 75	6 75	6 37	4 75	5 07	6 74	6 30	6 52
Mutton..... "	6 54	8 43	9 27	9 50	10 35	11 23	8 99	7 75	7 75	7 75	7 75	7 75	9 24	7 95	8 59

MARKET PRICES.—*Continued.*

TABLE No. IX.—Showing the average prices of Agricultural and Animal products, etc.

MARKETS.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	1st half-year.	2nd half-year.	Year.
TORONTO STREET MARKET.—*Continued.*	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Lamb.....per cwt.	7 61	8 96	9 55	10 00	13 88	14 57	10 23	9 50	9 50	9 50	9 50	9 50	10 80	9 62	10 21
Veal.....“	.....	.....	9 50	8 82	7 84	9 46	8 44	7 00	7 00	7 00	7 00	7 00	8 83	7 24	7 83
LONDON.															
Fall Wheat.....per bush.	1 30	1 29	1 28	1 31	1 29	1 30	1 22	1 10	1 00	0 91	0 90	0 90	1 29	1 02	1 16
Spring Wheat.....“	.....	.....	.....	1 24	1 29	1 24	.....	1 09	.....	.....	.....	.....	1 25	1 09	1 24
Barley.....“	0 76	0 77	0 80	0 75	0 74	0 74	0 74	0 72	0 72	0 58	0 60	0 63	0 76	0 66	0 72
Oats.....“	0 39	0 40	0 41	0 41	0 44	0 46	0 48	0 53	0 48	0 36	0 35	0 36	0 42	0 41	0 41
Peas.....“	0 87	0 88	0 87	0 84	0 83	0 90	0 90	0 89	0 80	0 69	0 67	0 68	0 87	0 76	0 80
GUELPH.															
Fall Wheat.....per bush.	1 26	1 25	1 20	1 28	1 30	1 27	1 24	1 15	1 04	0 92	0 91	0 91	1 26	1 03	1 14
Spring Wheat.....“	1 27	1 25	1 21	1 29	1 31	1 27	1 26	1 15	1 06	0 93	0 92	0 91	1 27	1 04	1 15
Barley.....“	0 79	0 78	0 75	0 81	0 78	0 67	0 63	0 62	0 60	0 56	0 53	0 51	0 76	0 57	0 67
Oats.....“	0 40	0 41	0 40	0 42	0 46	0 46	0 48	0 53	0 48	0 38	0 36	0 36	0 42	0 43	0 43
Peas.....“	0 74	0 77	0 76	0 77	0 74	0 79	0 81	0 77	0 80	0 71	0 68	0 68	0 76	0 74	0 75
BRANTFORD.															
Fall Wheat.....per bush.	1 27	1 31	1 22	1 27	1 31	1 30	1 21	1 04	0 94	0 92	0 89	0 89	1 28	0 98	1 12
Spring Wheat.....“	1 27	...	1 25	1 34	1 34	1 32	1 27	1 15	0 98	0 97	0 97	0 97	1 32	1 04	1 16
Barley.....“	0 75	0 75	0 70	0 73	0 75	0 73	0 84	0 79	0 69	0 63	0 60	0 60	0 74	0 67	0 71
Oats.....“	0 40	0 38	0 38	0 40	0 42	0 47	0 49	0 46	0 37	0 33	0 34	0 35	0 41	0 39	0 40
Peas.....“	0 71	0 72	0 75	0 73	0 77	0 86	0 88	0 84	0 75	0 64	0 64	0 65	0 75	0 71	0 74
ST. THOMAS.															
Fall Wheat.....per bush.	1 29	1 28	1 26	1 28	1 33	1 27	1 26	1 14	0 98	0 91	0 89	0 89	1 28	1 00	1 13
Spring Wheat.....“	1 29	1 28	1 26	1 32	1 43	1 31	1 30	1 08	0 94	0 89	0 89	0 88	1 30	0 98	1 15
Barley.....“	0 71	0 71	0 71	0 74	0 78	0 78	.....	.....	.....	0 62	0 65	0 80	0 73	0 73	0 73
Oats.....“	0 40	0 40	0 40	0 40	0 42	0 46	0 47	0 51	0 50	0 37	0 35	0 35	0 41	0 42	0 42
Peas.....“	0 75	0 75	0 85	0 99	1 08	1 07	.....	.....	0 80	0 66	0 68	0 74	0 91	0 71	0 84
LINDSAY.															
Fall Wheat.....per bush.	1 18	1 16	1 16	1 22	1 27	1 21	1 19	1 12	1 04	0 94	0 87	0 86	1 20	0 96	1 08
Spring Wheat.....“	1 21	1 16	1 17	1 26	1 30	1 24	1 27	1 18	1 07	0 98	0 91	0 89	1 24	1 00	1 12
Barley.....“	0 68	0 66	0 64	0 70	0 80	0 62	0 63	0 63	0 56	0 61	0 55	0 51	0 68	0 56	0 62
Oats.....“	0 40	0 39	0 37	0 41	0 47	0 46	0 49	0 53	0 46	0 37	0 34	0 38	0 42	0 41	0 41
Peas.....“	0 72	0 71	0 68	0 72	0 79	0 77	0 77	0 77	0 76	0 66	0 63	0 67	0 73	0 70	0 71

Belleville.															
Barley ..... per bush.	0 77	0 78	0 75	0 79	0 76	0 70	0 70	0 69	0 71	0 71	0 63	0 61	0 76	0 67	0 72
Peas ..... "	0 72	0 72	0 72	0 71	0 82	0 82	0 82	0 82	0 76	0 73	0 73	0 72	0 75	0 73	0 74
Kingston.															
Barley ..... per bush.	0 76	0 76	0 77	0 86	0 81	0 79	0 71	0 70	0 71	0 74	0 68	0 63	0 79	0 67	0 74
Peas ..... "	0 75	0 75	0 76	0 76	0 82	0 80	0 80	0 77	0 78	0 75	0 72	0 71	0 77	0 76	0 77
Ottawa.															
Rye ..... per bush.	0 72	0 72	0 72	0 72	0 72	.....	0 72	0 72	0 72	0 53	0 53	.....	0 72	0 70	0 72
Peas ..... "	0 73	0 72	0 72	0 72	0 72	0 76	0 73	0 78	0 82	0 70	0 73	0 72	0 73	0 72	0 73
Chatham.															
Beans ..... per bush.	2 45	2 85	2 83	2 74	2 50	2 54	2 75	1 95	1 62	1 26	1 50	1 65	2 65	1 78	2 34
Corn ..... "	0 58	0 61	0 63	0 63	0 66	0 81	0 76	0 79	0 82	0 59	0 49	0 48	0 63	0 64	0 63
Ridgetown.															
Beans ..... per bush.	2 26	2 63	2 63	2 63	2 63	2 62	2 63	2 62	.....	1 45	1 63	1 64	2 57	2 15	2 40
Corn ..... "	0 75	0 75	0 75	0 77	0 80	0 80	0 80	0 75	.....	.....	0 50	0 50	0 77	0 65	0 72
Average Prices for the Province.*															
Fall Wheat ..... per bush.	1 27	1 27	1 23	1 28	1 30	1 28	1 23	1 11	1 01	0 93	0 91	0 90	1 27	1 01	1 14
Spring Wheat ..... "	1 28	1 26	1 24	1 29	1 33	1 29	1 28	1 17	1 07	0 97	0 97	0 94	1 28	1 06	1 19
Barley ..... "	0 77	0 77	0 76	0 80	0 79	0 72	0 72	0 70	0 68	0 62	0 62	0 61	0 77	0 65	0 71
Oats ..... "	0 41	0 41	0 41	0 42	0 45	0 47	0 48	0 51	0 46	0 38	0 37	0 37	0 43	0 43	0 43
Peas ..... "	0 74	0 76	0 78	0 79	0 83	0 82	0 79	0 81	0 79	0 68	0 70	0 70	0 79	0 74	0 76
Rye ..... "	0 82	0 81	0 80	0 80	0 82	0 78	0 71	0 72	0 64	0 62	0 62	0 60	0 81	0 64	0 74
Corn ..... "	0 61	0 63	0 64	0 67	0 68	0 80	0 78	0 78	0 82	0 59	0 49	0 48	0 66	0 64	0 65
Beans ..... "	2 39	2 79	2 79	2 69	2 53	2 58	2 69	2 29	1 62	1 30	1 55	1 65	2 62	1 92	2 35

LIVE STOCK MARKETS.

Toronto.															
Cattle ..... per cwt.	3 47	3 33	3 95	4 16	4 50	4 97	4 13	4 10	4 06	4 44	4 07	4 25	4 09	4 24	4 18
Calves ..... each	8 06	9 00	9 60	8 25	7 58	10 80	11 75	8 20	7 25	7 50	.....	9 50	8 86	8 88	8 87
Sheep ..... per cwt.	4 62	4 25	4 75	6 16	5 91	5 37	5 06	4 75	4 75	.....	4 94	6 10	5 21	5 15	5 18
Lambs ..... each	5 59	5 63	5 25	6 63	7 13	6 44	3 13	3 30	3 82	3 84	3 64	4 25	6 04	3 69	4 58
Hogs ..... per cwt.	6 08	6 33	6 20	6 50	7 04	7 00	7 25	7 65	7 21	6 27	5 86	6 16	6 51	6 57	6 55
Montreal.															
Cattle ..... per cwt.	4 36	5 01	4 99	5 57	5 79	6 55	5 16	5 80	5 32	4 54	4 48	5 00	5 22	5 11	5 19
Calves ..... each	6 40	7 39	8 91	6 36	6 03	8 50	7 25	5 75	5 75	10 25	9 50	.....	7 03	7 50	7 10
Sheep ..... per cwt.	5 33	6 16	6 87	9 00	8 25	8 00	6 75	6 50	6 67	6 00	6 20	6 38	6 96	6 49	6 83
Lambs ..... each	4 44	4 80	5 12	3 08	4 44	4 25	3 58	3 68	3 54	3 38	3 66	3 88	4 88	3 60	4 18
Hogs ..... per cwt.	6 75	6 79	7 02	7 37	7 76	7 94	7 53	7 33	7 85	.....	6 94	6 81	7 28	7 44	7 33

* The average price of Fall Wheat for the five months, August—December, was $0.971; Spring Wheat, $1.019; Barley, $0.638; Oats, $0.42; Peas, $0.726, and Rye, $0.623. The average price of beans for the four months, September—December, was $1.55, and of corn for the three months, October—December, $0.50.

AGRICULTURAL EXPORTS OF ONTARIO AND QUEBEC.

TABLE No. X.—Showing the chief exports of Agricultural Products and Animals and their Products from the Provinces of Ontario and Quebec for the eleven fiscal years ending 30th June, 1881; also the values of total exports and of the exports to Great Britain for each year, as furnished by the Trade Returns to the Dominion Parliament.

Year.	Wheat.				Barley and Rye.				Peas.			
	Ontario.		Quebec.		Ontario.		Quebec.		Ontario.		Quebec.	
	Bush.	$	Bush.	$	Bush.	$	Bush.	$	Bush.	$	Bush.	$
1871	636,413	738,333	1,112,498	1,243,464	4,527,426	3,210,710	305,302	214,623	312,237	253,660	847,458	747,830
1872	1,456,178	1,889,109	1,536,941	2,011,463	5,400,501	3,330,010	205,745	144,568	319,818	256,982	1,138,175	987,750
1873	1,240,252	1,671,335	3,139,485	4,352,531	4,219,215	2,891,696	119,787	61,516	318,571	227,195	808,417	698,919
1874	1,433,819	1,725,831	5,147,368	7,160,216	3,460,980	3,817,878	218,685	228,092	563,365	439,694	1,153,580	953,803
1875	600,954	591,930	3,782,068	4,367,806	5,156,966	5,177,640	253,331	178,441	643,332	551,167	2,195,315	2,102,113
1876	1,850,321	1,786,576	4,220,070	4,962,719	9,920,819	7,253,487	243,752	173,358	1,303,970	963,126	1,094,806	1,007,365
1877	409,087	440,294	1,984,068	2,302,089	6,178,219	4,451,903	255,640	174,505	688,443	542,623	1,056,962	951,401
1878	2,161,802	2,438,179	2,180,075	2,905,392	6,983,765	4,080,893	694,436	482,961	987,919	728,337	1,431,154	1,254,268
1879	3,277,363	2,919,366	3,272,050	3,326,125	5,565,598	4,823,769	455,201	296,534	696,244	500,890	2,018,341	1,554,314
1880	2,730,356	3,273,696	2,327,310	2,646,906	7,377,418	4,569,925	912,497	608,819	1,030,052	755,881	2,788,927	2,221,025
1881	1,095,875	1,098,470	1,418,547	1,487,672	8,361,457	6,385,239	796,261	650,195	864,036	689,563	3,380,965	2,787,637

Year.	Oats.				Beans.				Malt.			
	Ontario.		Quebec.		Ontario.		Quebec.		Ontario.		Quebec.	
	Bush.	$	Bush.	$	Bush.	$	Bush.	$	Bush.	$	Bush.	$
1871	112,288	43,849	392,465	170,008	26,909	30,399	8,510	14,308	167,939	132,810	.....	.....
1872	38,449	14,181	421,316	152,974	40,731	58,355	4,362	7,195	202,969	172,060	38,920	33,200
1873	975	335	595,223	201,651	45,475	62,840	4,837	9,283	368,554	208,534	6,440	6,603
1874	27,158	9,698	207,689	93,314	85,792	125,215	4,136	7,293	474,970	145,917	6,129	7,863
1875	628,565	287,450	850,481	386,423	107,503	122,880	3,911	5,527	101,889	109,517	.....	.....
1876	113,062	39,495	1,063,690	463,380	68,000	58,526	7,229	6,301	144,714	135,778	9,212	8,558
1877	28,999	13,440	1,205,298	465,610	116,504	115,240	3,334	3,911	299,996	269,717	7,336	6,146
1878	10,478	3,221	658,031	230,550	70,275	74,844	790	961	614,199	439,792	.....	.....
1879	1,883	731	407,640	145,748	57,620	51,484	1,413	1,461	182,055*	423,246	2*	12
1880	55,857	19,038	2,059,629	695,214	66,373	67,204	8,753	9,634	379,849*	843,001	.....	.....
1881	45,449	16,352	1,258,111	466,249	102,751	110,399	6,106	7,193	255,061	649,534	.....	.....

* Cwt.

TABLE No. X.—AGRICULTURAL EXPORTS OF ONTARIO AND QUEBEC.—*Continued.*

Year.	Flour.				Oatmeal.				Green Fruit.			
	Ontario.		Quebec.		Ontario.		Quebec.		Ontario.		Quebec.	
	Brls.	$	Brls.	$	Brls.	$	Brls.	$	Brls.	$	Brls.	$
1871	16 000	78,227	278,832	1,454,448	12,104	58,225	6,174	27,960	25,339	37,873	14,805	41,219
1872	81,865	462,991	357,093	2,107,990	10,854	49,473	10,854	49,473	54,201	87,450	42,333	144,672
1873	61,515	366,767	401,455	2,458,144	10,764	49,561	34,282	171,151	7,058	12,515	37,623	131,503
1874	167,763	968,122	364,258	2,166,208	9,085	39,505	43,270	188,123	24,899	42,661	23,048	75,136
1875	33,748	175,956	255,700	1,285,002	15,854	63,482	14,025	73,040	9,234	19,513	44,551	132,046
1876	113,212	558,808	296,596	1,585,654	38,988	167,191	23,689	115,084	63,022	109,572	13,889	41,989
1877	60,621	336,784	198,090	1,083,216	15,612	66,249	17,800	83,625	25,333	48,588	49,827	139,354
1878	185,497	1,009,728	284,283	1,669,710	108,188	467,576	66,033	285,157	6,844	15,294	27,359	85,136
1879	269,585	1,172,815	297,823	1,359,897	47,882	180,789	51,935	219,058	19,841	31,419	42,392	83,496
1880	284,520	1,547,910	255,068	1,350,884	502	1,828	914	782	32,250	57,248	85,085	214,261
1881	265,137	1,275,422	169,013	868,384	26,696	105,148	27,029	128,510	99,834	159,118	178,045	355,288

Year.	Horses.				Horned Cattle.				Swine.			
	Ontario.		Quebec.		Ontario.		Quebec.		Ontario.		Quebec.	
	No.	$	No.	$	No.	$	No.	$	No.	$	No.	$
1871	6,721	650,451	8,085	746,385	66,411	1,923,207	11,075	283,079	9,338	37,530	1,782	9,315
1872	6,416	683,127	5,136	494,664	16,137	433,781	3,301	105,508	2,381	11,517	397	1,990
1873	4,247	469,561	3,916	403,594	11,871	301,751	9,518	235,518	5,087	83,382	164	848
1874	2,503	291,658	2,391	232,154	21,166	435,134	13,875	398,930	6,520	53,142	268	2,759
1875	1,950	215,349	1,834	187,710	22,158	448,789	11,605	226,611	16,532	150,629	151	1,334
1876	2,167	243,747	1,779	168,006	14,919	301,319	6,454	215,787	2,463	9,277	1,178	4,101
1877	3,576	352,862	4,350	396,565	11,244	202,467	6,185	372,673	1,439	10,060	505	1,316
1878	6,112	614,404	7,715	628,247	15,566	461,918	9,148	549,100	2,208	15,463	770	6,663
1879	6,558	638,882	9,667	708,699	18,008	533,535	23,703	1,437,490	3,920	24,936	2,579	34,158
1880	9,327	909,327	11,358	908,390	11,450	307,165	37,041	2,244,138	2,535	6,689	3,367	33,395
1881	12,292	1,216,215	8,821	807,829	7,631	244,828	46,373	2,810,212	2,006	4,280	594	6,346

TABLE No. X—AGRICULTURAL EXPORTS OF ONTARIO AND QUEBEC.—*Continued.*

Year.	Sheep.				Wool.				Eggs.			
	Ontario.		Quebec.		Ontario.		Quebec.		Ontario.		Quebec.	
	No.	$	No.	$	lbs.	$	lbs.	$	doz.	$	doz.	$
1871	239,065	634,036	71,796	185,652	2,110,942	651,355	774,387	186,040	2,217,579	259,766	676,316	111,288
1872	271,512	787,480	76,415	210,478	1,908,777	744,832	1,283,057	619,057	2,616,111	291,770	703,603	110,783
1873	215,496	671,592	83,549	238,996	1,719,378	826,053	1,316,444	611,330	2,570,948	311,540	765,775	140,799
1874	181,748	516,932	50,946	134,225	1,579,555	540,910	1,112,553	428,493	2,975,758	359,919	661,762	114,822
1875	165,704	444,082	47,565	118,881	1,324,610	461,306	1,228,526	444,145	2,285,481	280,987	325,569	51,788
1876	85,628	353,372	35,088	98,086	1,761,535	570,842	1,100,484	353,851	2,623,196	342,633	309,656	44,934
1877	160,057	453,370	33,253	88,263	787,112	213,448	1,592,817	470,167	3,044,940	349,842	1,118,192	78,493
1878	167,622	488,356	56,154	164,995	2,241,307	661,541	111,778	28,667	3,444,454	417,729	648,655	92,346
1879	201,328	568,191	89,498	375,104	2,507,172	587,712	412,977	83,487	3,382,350	358,404	864,635	88,324
1880	226,970	673,735	135,421	651,613	3,017,670	797,155	425,550	92,438	4,052,858	444,896	1,146,679	144,948
1881	194,205	609,034	130,658	685,290	1,271,786	381,562	20,708	5,958	5,729,847	696,554	1,453,564	190,992

Year.	Beef.				Pork.				Bacon and Hams.			
	Ontario.		Quebec.		Ontario.		Quebec.		Ontario.		Quebec.	
	cwt.	$	cwt.	$	cwt.	$	cwt.	$	cwt.	$	cwt.	$
1871	21,041	72,793	17,388	151,285	15,007	129,077	29,472	268,111	42,744	418,218	60,700	600,700
1872	11,824	91,922	6,421	54,901	3,212	14,517	13,688	95,367	85,500	630,154	39,939	369,002
1873	6,305	49,042	6,811	52,273	31,555	160,862	12,059	96,461	153,360	1,100,892	203,586	1,221,536
1874	38,738	296,911	15,449	135,675	87,275	211,772	10,317	85,034	121,193	947,593	59,214	635,894
1875	1,570	11,933	8,480	87,883	16,476	161,778	8,998	71,122	42,682	372,094	45,821	450,504
1876	5,782	51,620	7,537	71,923	16,375	91,703	13,230	115,351	56,900	564,205	24,442	282,816
1877	26,717	212,878	18,773*	139,437	10,112	89,173	13,427	108,065	102,286	841,980	38,335	406,881
1878	34,331	292,671	14,304	144,185	2,522	18,479	4,349	24,469	39,050	346,671	17,435	126,575
1879	15,266	115,156	2,187	19,363	2,345	12,791	1,494	7,199	35,320	214,044	11,067	73,734
1880	765	5,239	3,077	23,064	3,637	19,396	8,207	42,246	65,035	337,713	30,458	194,016
1881	444	3,277	8,263	57,358	3,543	25,532	9,195	72,285	71,306	531,011	32,144	226,355

* Mutton included.

TABLE No. X.—AGRICULTURAL EXPORTS OF ONTARIO AND QUEBEC.—*Continued.*

Year.	Lard.				Butter.				Cheese.			
	Ontario.		Quebec.		Ontario.		Quebec.		Ontario.		Quebec.	
	lbs.	$	lbs.	$	lbs.	$	lbs.	$	lbs.	$	lbs.	$
1871	522,829	58,480	731,190	84,753	2,366,957	486,909	12,329,584	2,428,679	2,000,780	233,328	6,262,493	876,019
1872	629,196	50,803	467,018	52,394	1,898,938	350,923	16,270,542	3,091,800	1,893,102	235,325	14,455,025	1,594,865
1873	713,116	48,557	1,610,032	154,144	2,459,301	446,993	12,005,534	2,229,195	3,875,960	458,402	15,589,794	1,819,712
1874	617,511	48,433	1,505,680	168,472	1,601,160	370,315	10,175,446	2,149,069	2,849,095	338,770	20,975,627	3,150,804
1875	187,733	21,250	125,619	15,531	721,166	206,804	7,550,596	1,915,735	4,527,118	559,043	27,709,939	3,309,358
1876	34,548	3,973	597,009	46,996	1,484,807	310,906	9,946,849	2,080,753	5,663,470	689,379	29,242,073	3,051,963
1877	141,517	14,173	394,488	48,252	1,048,625	217,536	12,920,358	2,714,958	6,000,293	710,637	29,908,342	3,035,188
1878	134,144	13,998	127,985	13,245	2,518,147	427,709	9,829,513	1,837,085	13,612,051	1,411,856	24,428,695	2,583,931
1879	257,703	12,958	53,520	5,361	2,754,163	343,990	10,879,397	1,664,689	19,670,539	1,669,010	26,719,224	2,118,680
1880	262,379	13,920	233,992	17,106	2,690,268	460,843	14,917,053	2,475,775	13,517,729	1,199,973	26,770,182	2,687,062
1881	96,908	5,628	107,650	13,685	3,016,429	617,636	13,818,723	2,817,460	16,525,879	1,771,736	32,726,362	3,738,310

Abstract of total agricultural exports from each Province and of exports to Great Britain, with grand totals for both Provinces.

Year.	Ontario.		Quebec.		Grand Totals.	
	Total Exports.	To Britain.	Total Exports.	To Britain.	To all Countries.	To Britain.
	$	$	$	$	$	$
1871	10,765,220	939,591	10,907,824	8,139,154	21,673,044	9,078,745
1872	11,460,455	1,065,125	13,575,695	9,327,763	25,036,150	10,392,888
1873	11,271,932	1,766,239	16,635,693	12,558,652	27,907,625	14,324,891
1874	12,315,177	1,692,161	19,445,670	15,348,860	31,760,847	17,041,021
1875	11,075,425	1,133,339	16,099,290	13,160,297	27,174,715	14,293,636
1876	15,871,511	1,846,449	16,159,385	13,575,175	32,037,896	15,421,624
1877	11,276,616	1,981,045	14,194,320	11,439,735	25,470,936	13,420,780
1878	15,186,321	5,692,842	13,832,056	11,872,612	29,018,377	17,565,454
1879	16,136,627	5,992,342	14,296,342	12,136,098	30,432,969	18,128,440
1880	17,907,145	7,057,033	18,524,835	15,221,946	36,431,980	22,278,979
1881	18,254,467	6,272,121	20,720,714	16,824,151	38,975,181	23,096,272

CENSUS RETURNS OF ACREAGE AND CROPS.

TABLE No. XI.—Showing by decennial stages the Agricultural Progress of Ontario in the twenty years, 1851–71. (The census of 1871 gives the Crop Acreage of Wheat and Potatoes only.)

BY THE CENSUS OF	Total Population.	The Farm Land.				Wheat.		Barley.		Rye.	
		No. of Occupiers.	Acres Occupied.	Acres Cultivated.	Wood and Wild Land.	Acres.	Bush.	Acres.	Bush.	Acres.	Bush.
1851	952,004	99,906	9,825,915	3,702,783	6,123,132	798,275	12,682,550	30,129	625,452	49,066	318,429
1861	1,396,091	131,983	13,354,907	6,051,619	7,303,288	1,386,365	24,620,425	118,940	2,821,962	70,376	973,181
1871	1,620,851	172,258	16,161,676	8,833,626	7,328,040	1,365,905	14,233,389		9,461,233		547,609

TABLE No. XI.—*Continued.*

BY THE CENSUS OF	Peas.		Oats.		Buckwheat.		Corn.		Potatoes.	
	Acres.	Bush.	Acres.	Bush.	Acres.	Bush.	Acres.	Bush.	Acres.	Bush.
1851	186,643	3,127,681	413,058	11,391,867	44,264	579,935	72,047	1,688,805	77,966	4,982,186
1861	460,595	9,601,396	678,337	21,220,874	74,565	1,248,637	79,918	2,256,290	137,266	15,325,920
1871		7,653,545		22,138,958		585,158		3,148,467	174,641	17,138,534

TABLE No. XI.—CENSUS RETURNS OF ACREAGE AND CROPS.—*Continued.*

BY THE CENSUS OF	Bush. Turnips.	Bush. Carrots.	Bush. Mangel Wurzel.	Bush. Beans.	Lbs. Hops.	Tons Hay.	Bush. Clover and Hay Seed.	Lbs. Flax and Hemp.	Lbs. Tobacco.	Lbs. Maple Sugar.
1851	3,110,318	174,689	54,206	18,309	113,527	693,727	39,029	59,680	777,426	3,669,874
1861	18,206,959	1,905,598	546,971	49,143	247,052	861,844	61,818	1,225,934	.....	6,970,605
1871	22,455,543	2,706,903		107,925	1,188,940	1,805,476	189,716	1,165,117*	399,870	6,247,442

* Dressed Flax.

TABLE No. XI.—*Continued.*

BY THE CENSUS OF	Milch Cows.	Other Cattle.	Horses.	Sheep.	Pigs.	Lbs. Butter.	Lbs. Cheese.*	Bbls. Beef.	Bbls. Pork.	Lbs. Wool.
1851	297,070	417,389	201,670	1,050,168	571,496	16,064,532	2,292,600	113,445	317,010	2,619,434
1861	451,640	563,688	377,681	1,170,225	776,001	26,828,264	2,687,172	67,508	336,744	3,659,766
1871	638,759	761,415	489,001	1,514,914	874,664	37,623,643	3,432,797	——†	——†	6,411,305

* Home made. † Returns give No. of animals killed.

FACTORY CHEESE.

TABLE No. XII.—Showing by Counties the quantity of Milk used, the quantity and value of Cheese made, and the quantity of Cheese on hand, as returned for 306 Factories in December, 1882; also the total number of Factories in the Province in 1882.

COUNTY.	Factories.		Milk Used.	Cheese Made.	Value of Cheese.	Cheese on Hand.
	Total Number.	Number making Returns.	lbs.	lbs.	$	lbs.
Kent	12	5	3,054,764	293,576	32,070	
Elgin	25	13	12,164,698	1,171,984	125,720	
Norfolk	18	4	2,841,510	269,217	28,832	
Haldimand	5	5	3,183,446	318,344	5,917	
Welland	4	3	259,112	25,849	3,060	
Lambton	12	9	7,306,141	705,404	75,995	
Huron	16	11	12,232,175	1,190,212	132,110	491
Bruce	7	4	3,269,566	317,092	34,213	
Simcoe	6	2	525,000	52,500	5,322	
Middlesex	25	16	22,688,777	2,191,082	241,130	
Oxford	31	15	25,578,094	2,494,035	268,550	
Brant	7	2	1,970,522	191,475	21,712	
Perth	33	18	24,123,724	1,883,919	209,465	
Wellington	8	7	5,461,005	530,989	59,256	
Waterloo	8	8	6,860,290	639,328	66,529	324
Wentworth	3	3	4,165,804	402,141	40,097	5,486
Peel	3	2	1,901,204	164,226	17,673	50
York	3	2	356,340	34,142	3,934	
Ontario	5	2	644,398	53,812	6,935	
Durham	6	4	2,902,862	278,850	30,751	
Northumberland	19	13	12,423,333	1,228,751	133,853	
Prince Edward	10	7	3,466,800	342,648	37,326	
Lennox and Addington	10	10	8,454,817	820,295	89,700	
Frontenac	20	6	3,373,799	349,284	36,397	
Leeds and Grenville	49	27	19,138,414	1,823,329	197,775	3,762
Dundas	5	4	2,308,646	231,930	24,639	
Stormont	10	14	9,063,770	919,619	101,659	
Glengarry	43	42	26,000,000	2,600,000	300,000	
Lanark	8	5	4,169,440	411,591	43,973	2,229
Victoria	4	3	2,379,626	234,121	25,454	
Peterborough	9	8	5,684,132	558,731	60,202	
Hastings	31	27	24,415,660	2,492,857	271,861	
Other Counties	16	5	3,445,946	341,098	34,975	
Total	471	306	265,813,755	25,562,431	2,767,085	12,342

MANUFACTURES.

TABLE No. XIII.—Showing by Counties and Cities the amount of capital, the number of employees, the amount of yearly wages, the value of raw material and the value of products of Manufacturing Establishments in Ontario making returns to the Bureau for 1882; also the total number of Manufacturing Establishments in each County and City of the Province in 1882.

COUNTIES.	Establishments.		Capital invested.	No. of Employees.	Amount of yearly wages.	Value of raw material.	Value of products.
	Total number.	Number making returns.					
			$		$	$	$
Essex	124	14	252,500	223	83,050	128,455	253,284
Kent	150	23	121,300	242	76,154	160,300	303,300
Elgin	124	12	88,300	90	23,026	102,048	168,325
Norfolk	119	25	210,200	286	104,640	222,300	404,300
Haldimand	78	10	43,588	34	9,842	52,829	71,248
Welland	75	10	171,467	122	36,350	409,300	486,051
Lambton	145	17	165,100	196	68,008	222,200	369,340
Huron	230	60	725,040	618	176,635	521,805	820,324
Bruce	198	23	164,000	148	39,010	257,230	365,400
Grey	208	40	261,500	260	92,890	371,334	550,500
Simcoe	292	59	1,246,550	1,099	349,160	429,676	1,079,962
Middlesex	168	20	203,500	243	57,500	205,425	310,030
Oxford	195	29	474,500	522	142,057	437,593	797,880
Brant	90	19	273,500	325	107,800	486,525	658,306
Perth	182	27	383,077	513	154,633	325,820	582,360
Wellington	172	27	222,000	284	76,350	219,850	365,050
Waterloo	233	38	1,145,988	1,157	336,070	1,627,589	2,287,561
Dufferin	45	11	35,300	34	10,914	29,102	57,069
Lincoln	63	13	218,000	214	96,075	207,210	343,700
Wentworth	95	11	571,100	596	149,222	246,400	555,350
Halton	82	16	314,800	211	68,075	248,365	384,200
Peel	97	7	184,990	184	74,650	230,362	428,005
York	231	30	480,500	498	145,993	479,453	806,515
Ontario	177	25	898,000	882	329,894	734,722	1,333,613
Durham	120	24	269,900	104	33,560	305,825	391,100
Northumberland	101	16	173,900	214	55,050	296,120	414,800
Prince Edward	57	16	98,800	153	28,600	113,450	164,000
Lennox and Addington	96	10	110,500	169	45,146	57,400	123,000
Frontenac	46	7	76,400	49	15,500	54,900	82,100
Leeds and Grenville	201	27	508,400	533	206,000	352,325	707,775
Dundas	71	16	201,500	149	46,954	415,160	552,870
Stormont	59	8	334,400	275	81,220	204,644	393,100
Glengarry	57	2	7,000	19	2,500	4,000	9,450
Prescott	24						
Russell	23	5	508,500	259	37,550	212,300	307,100
Carleton	61	2	156,000	82	25,500	101,750	143,000
Renfrew	74	17	126,500	101	30,648	127,500	196,200
Lanark	140	24	973,700	983	262,280	611,130	1,119,636
Victoria	92	23	1,010,500	697	215,074	427,070	796,000
Peterboro'	81	16	279,800	283	86,350	236,000	407,300
Haliburton	3						
Hastings	77	8	75,000	38	13,120	56,994	90,158
Muskoka	41	17	1,486,600	812	309,092	244,443	843,851
Algoma	11	1	100,000	50	30,000	15,000	55,000
Parry Sound	12	3	1,157,000	652	225,750	91,000	513,400
Belleville	44	6	66,700	100	27,447	34,710	88,797
Brantford	33	3	215,000	295	102,000	231,000	485,000
Guelph	53	11	352,950	483	169,690	376,559	681,108
Hamilton	135	15	1,171,200	1,442	482,563	856,069	1,554,580
Kingston	33	9	516,950	552	102,865	259,884	478,791
London	103	11	1,149,000	739	275,324	800,148	1,489,781
Ottawa	55	7	139,000	114	48,585	247,780	333,669
St. Catharines	37	10	515,500	359	160,413	211,295	501,399
St. Thomas	34	8	301,000	297	79,680	183,600	380,100
Toronto	282	31	3,010,927	2,045	736,116	2,152,739	4,099,987
Totals	5,829	919	23,947,427	20,930	6,741,969	17,636,688	31,175,716

MANUFACTURES.

TABLE No. XIV.—Showing by Industries the amount of capital, the number of the value of products of Manufacturing Establishments in Ontario making returns class in the Province in 1882.

INDUSTRIES.	Establishments.		Capital invested.	No. of Employees.	Amount of Yearly Wages.	Average of Yearly Wages.
	Total number.	Number making returns.				
			$		$	$
Agricultural implement works	122	44	3,203,890	2,397	954,586	398
Bent stuff and handle factories	36	6	39,500	111	32,746	295
Boot and shoe factories	16	5	77,600	332	102,660	309
Breweries and malting houses	91	16	572,000	192	79,510	414
Brick and tile yards	117	39	213,100	425	105,177	247
Broom and brush works	35	3	55,800	108	22,835	211
Button factories	8	2	16,000	145	25,000	172
Cabinet and furniture shops	463	38	889,300	1,045	378,682	362
Carding and fulling mills	52	4	14,500	23	5,575	242
Carriage and waggon shops	1,238	96	433,738	672	214,402	319
Cigar and tobacco factories	61	6	189,500	355	106,600	300
Cotton factories	14	3	1,217,950	1,139	256,960	225
Edge tool works	31	3	117,000	171	76,900	450
Engine and boiler works	26	11	431,000	496	216,700	437
Flour and grist mills	661	76	1,123,488	477	182,271	382
Foundries and machine shops	256	27	1,363,650	1,150	476,100	414
Gas works	15	5	1,236,000	175	83,850	479
Hosiery factories	35	13	528,000	801	196,850	228
Meat curing and packing houses	27	3	81,600	54	22,000	407
Musical instrument factories	29	3	130,000	270	130,000	481
Nail and rivet works	10	3	140,000	293	116,150	396
Oil Refineries	27	3	560,000	221	72,800	330
Paper and pulp mills	31	4	285,000	168	58,000	343
Pot and pearl asheries	36	3	9,140	17	6,080	357
Preserved meats and fruits factories	23	6	78,000	214	29,745	139
Pump factories	130	21	85,600	260	73,993	284
Salt works	17	6	250,000	100	30,000	300
Sash, door and blind factories	222	30	299,700	440	163,753	372
Saw mills	796	72	5,171,300	3,466	1,155,373	333
Scutching mills	26	4	44,000	105	20,700	197
Shingle factories	135	9	35,000	103	35,120	341
Tanneries	248	34	392,400	269	100,116	372
Trunk and box factories	31	4	76,000	209	64,500	308
Vinegar Factories	16	2	23,000	16	2,700	169
Woodenware factories	77	7	37,500	84	24,276	289
Woollen factories	229	34	1,633,277	2,000	491,436	246
Miscellaneous	442	274	2,893,894	2,427	627,823	255
Total	5,829	919	23,947,427	20,930	6,741,969	322

MANUFACTURES.

employees, the amount and average of yearly wages, the value of raw material and to the Bureau for 1882; also the total number of Manufacturing Establishments of each

Value of Raw Material.	Value of Products.	Percentage of Raw Material in Gross Products.	Value of Net Product.	Value of Net Product per Hand.	INDUSTRIES.
$	$		$	$	
1,340,897	3,833,018	35	2,492,121	1,040	Agricultural implement works.
28,000	81,400	34	53,400	481	Bent stuff and handle factories.
150,346	308,596	48	158,250	446	Boot and shoe factories.
334,735	526,475	63	191,740	999	Breweries and malting houses.
45,870	239,110	19	193,240	454	Brick and tile yards.
37,084	66,891	55	29,807	276	Broom and brush works.
15,600	55,000	28	39,400	272	Button factories.
371,420	974,932	38	603,512	578	Cabinet and furniture shops.
18,550	32,350	57	13,800	600	Carding and fulling mills.
246,224	627,238	39	381,014	567	Carriage and waggon shops.
234,327	386,565	61	152,238	429	Cigar and tobacco factories.
286,400	683,400	42	397,000	348	Cotton factories.
103,500	203,000	51	99,500	582	Edge tool works.
201,300	570,000	35	368,700	743	Engine and boiler works.
4,408,705	4,994,261	88	585,556	1,228	Flour and grist mills.
644,493	1,439,425	46	794,932	691	Foundries and machine shops.
94,001	350,812	27	256,811	1,467	Gas works.
505,500	792,400	64	286,900	332	Hosiery factories.
653,200	769,000	85	115,800	2,144	Meat curing and packing houses.
145,000	380,500	52	235,500	872	Musical instrument factories.
300,150	478,406	63	178,256	608	Nail and rivet works.
505,000	680,000	74	175,000	792	Oil refineries.
147,000	284,000	52	137,000	811	Paper and pulp mills.
2,085	14,434	14	12,349	726	Pot and pearl asheries.
49,315	92,400	53	43,085	201	Preserved meats and fruits factories.
64,410	176,410	37	112,000	403	Pump factories.
66,000	108,000	61	42,000	420	Salt works.
304,452	586,900	52	282,448	642	Sash, door and blind factories.
1,162,327	3,160,705	37	1,998,378	576	Saw mills.
18,900	49,000	39	30,100	287	Scutching mills.
28,226	87,162	32	58,936	572	Shingle factories.
460,354	675,950	68	215,596	801	Tanneries.
114,000	232,700	49	118,700	568	Trunk and box factories.
6,200	12,700	49	6,500	406	Vinegar works.
19,549	59,010	33	39,461	470	Woodenware factories.
1,377,785	2,445,060	56	1,067,275	533	Woollen factories.
3,145,783	4,718,506	67	1,572,723	648	Miscellaneous.
17,636,688	31,175,716	57	13,539,028	647	

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TABLE No. XV.—Monthly Temperatures for the year 1882 as recorded at the principal stations in Ontario, showing for each Month the mean highest, the mean lowest, and the mean of all ranges.

MONTH.	TEMPERATURE.	Goderich.	Windsor.	Simcoe.	Stratford.	Hamilton.	Toronto.	Peterboro'.	Barrie.	Cornwall.	Pembroke.
		°	°	°	°	°	°	°	°	°	°
January	Mean highest ..	30.5	33.6	33.2	28.7	35.4	30.3	28.7	27.5	22.4	21.2
	Mean lowest...	17.4	18.1	17.9	11.3	12.8	15.5	11.2	6.2	2.1	3.1
	Monthly mean .	23.3	25.8	24.6	20.3	25.7	23.2	19.3	19.0	12.9	9.0
February	Mean highest ..	37.3	43.0	39.4	37.2	42.1	37.4	35.6	36.3	30.8	31.7
	Mean lowest...	25.6	24.3	23.2	21.1	21.6	23.1	17.5	17.1	13.0	10.3
	Monthly mean.	31.1	33.8	31.6	28.9	33.1	30.3	27.1	27.2	21.9	20.1
March	Mean highest ..	37.5	44.5	42.0	38.1	42.9	38.3	38.2	36.7	36.4	35.2
	Mean lowest...	28.6	27.8	25.4	22.9	22.8	25.4	19.8	18.1	19.2	12.5
	Monthly mean.	30.8	36.1	33.0	29.9	34.0	31.7	29.5	27.9	26.2	22.8
April	Mean highest ..	48.1	55.0	51.7	49.2	53.6	48.3	48.8	47.4	45.9	42.9
	Mean lowest...	34.3	32.8	30.6	29.7	29.2	32.0	29.4	28.1	29.6	26.3
	Monthly mean.	39.5	44.3	42.0	39.1	42.9	40.0	40.1	38.7	37.3	35.8
May	Mean highest ..	59.0	62.5	59.1	58.5	60.0	57.3	60.2	59.9	60.9	61.4
	Mean lowest...	43.7	40.4	38.6	38.0	36.2	40.6	37.8	37.0	41.5	38.2
	Monthly mean.	49.7	51.9	50.1	48.6	50.2	48.9	51.4	49.1	50.4	49.4
June	Mean highest ..	70.5	77.4	74.0	71.9	75.0	70.7	72.8	71.9	72.9	73.4
	Mean lowest...	53.6	54.6	52.1	49.6	47.0	52.0	49.7	50.3	52.9	50.7
	Monthly mean.	61.9	66.8	64.0	61.2	63.7	61.6	63.3	61.7	62.4	62.2
July	Mean highest ..	75.6	80.5	74.8	75.4	79.5	76.9	79.4	77.4	77.3	79.5
	Mean lowest...	58.7	57.5	53.4	53.3	52.6	56.9	53.7	55.9	59.5	56.0
	Monthly mean.	68.2	69.8	69.0	64.5	69.5	66.8	69.9	67.9	67.9	67.4
August	Mean highest ..	76.4	78.6	77.1	.....	78.8	76.0	79.3	76.2	79.0	79.3
	Mean lowest...	61.3	60.2	59.2	.....	56.4	59.2	56.5	57.6	56.9	56.7
	Monthly mean.	67.5	70.2	68.0	.....	69.2	67.4	70.0	68.1	67.1	67.5
September	Mean highest ..	70.0	73.6	70.4	70.1	73.2	70.0	72.5	70.6	69.0	68.4
	Mean lowest ...	53.7	52.7	50.2	49.6	49.8	53.1	49.0	51.7	48.9	47.1
	Monthly mean.	62.0	64.8	61.6	59.2	63.1	61.3	61.3	60.9	58.0	57.2
October	Mean highest ..	62.0	67.2	62.9	62.6	66.0	60.5	60.7	61.6	60.8	60.6
	Mean lowest...	46.0	42.9	39.5	41.0	40.5	42.6	39 4	41.5	39.4	38.2
	Monthly mean.	53.7	55.4	52.1	50.7	53.8	51.8	50.2	51.4	50.0	48.0
November	Mean highest ..	42.6	45.4	43.3	40.7	47.2	41.6	40.6	41.4	39.1	38.1
	Mean lowest...	32.5	30.7	26.8	25.2	26.4	29.4	24.6	26.0	24.7	25.1
	Monthly mean.	37.1	38.6	35.3	33.5	37.6	35.9	33.1	33.5	31.8	30.0
December	Mean highest ..	30.6	32.3	32.1	29.0	32.4	30.9	29.1	29.6	25.4	24.4
	Mean lowest...	22.3	20.4	18.7	15.8	16.7	20.0	9.7	15.6	11.1	9.7
	Monthly mean.	26.4	26.9	25.4	23.4	26.2	26.1	22.8	24.0	19.1	17.5

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TABLE No. XVI.—Summary of the total fall of Rain and Snow in Ontario during the year 1882 at the several Stations reporting for the whole year, and the number of days on which Rain or Snow fell.

STATIONS.	OBSERVERS.	RAIN.		SNOW.	
		Depth, Inches.	No. of Days.	Depth, Inches.	No. of Days.
Windsor	A. Sinclair, M.A.	23.81	90	18.5	17
Simcoe	Rev. G. Grant, B.A	26.75	103	29.2	23
Goderich	H. J. Strang, B.A.	20.96	112	90.1	72
Stratford	C. J. Macgregor, M.A	26.96	95	62.3	61
Goderich L. House	G. M. Macdonald	20.99	116	92.5	75
Zurich	G. Hess	33.21	117	136.5	50
Woodstock	Prof. Wolverton, B.A.	25.05	90	87.5	43
Port Dover	H. Morgan	26.59	137	44.8	63
Port Stanley	M. Payne	28.78	136	38.6	65
Granton	J. Grant	25.37	107	99.0	67
Lucan	G. Cathcart	26.39	90	.....	.....
Listowel	A. Ray	22.50	103	106.5	70
Guelph	A. Shuttleworth	19.39	73	57.2	42
Brantford	T. M. McIntyre, M.A	23.42	68	.....	.....
Conestogo	Dr. Passmore	20.18	123	93.4	96
Parry Sound	Rev. R. Mosley	26.02	99	79.9	68
Owen Sound	J. McLean	21.91	67	113.0	43
Presqu'Isle	J. McKenzie	28.78	64	84.0	55
Penetanguishene	Rev. J. McBride	13.04	90	123.5	52
Saugeen	Mrs. K. Stewart	18.47	107	96.9	81
Point Clark	John Young	14.52	86	75.9	59
Orillia	H. A. Fitton	14.23	103	118.0	82
Georgina	Captain Sibbald, R.N.	16.48	102	60.0	69
Barrie	H. B. Spotton, M.A	14.32	76	113.7	61
Beatrice	J. Hollingsworth	29.56	99	170.6	52
Gravenhurst	F. M. Robinson	22.15	94	88.4	62
Egremont	J. W. Stevenson	19.74	69	60.0	.....
Toronto	Observatory	20.59	110	42.5	62
Hamilton	G. Dickson, B.A.	26.83	101	49.2	38
Cornwall	James Smith, M.A	22.45	116	69.4	74
Peterborough	John Dixon, M.A.	24.88	67	49.7	34
Lakefield	S. Sheldrake	15.43	66	66.8	32
Lindsay	T. Beall	23.20	95	77.7	50
Kingston	A. P. Knight, M.A.	23.99	118	78.5	73
Rockliffe	W. H. McIntyre	28.79	108	102.1	61
Pembroke	A. Thomson	37.55	101	74.0	34
Northcote	F. Kosmark	21.99	82	69.0	31
Elora	W. La Penotiere	19.40	96	76.0	54

TABLE No. XVII.—Showing total depth of Rain and melted Snow at 70 Stations in Ontario, July to December (inclusive), 1882.

Station.	County.	Precipitation.	Station.	County.	Precipitation.	Station.	County.	Precipitation.
Windsor	Essex	11.7	St. Thomas	Elgin	16.1	N. Glanford	Wentworth	12.3
Stony Point	do	10.7	Port Dover	Norfolk	12.9	Copetown	do	14.9
Tecumseh	do	11.6	Simcoe	do	12.9	St. Catherines	Lincoln	12.9
Maidstone	do	15.7	Woodstock	Oxford	16.7	Georgina	York	10.3
Cottam	do	14.4	Conestogo	Waterloo	15.2	Toronto	do	11.8
Amherstburg	do	14.9	Brantford	Brant	10.0	Lindsay	Victoria	16.7
Goderich	Huron	14.7	Fergus	Wellington	13.3	Brechin	Ontario	9.7
Zurich	do	23.7	Guelph	do	11.8	Peterborough	Peterborough	13.1
Hensall	do	14.9	Elora	do	15.0	Lakefield	do	12.8
Egmondville	do	19.0	Owen Sound	Grey	17.4	Ennismore	do	13.3
Goderich L. House	do	14.4	Presqu' Isle	do	19.4	Pembroke	Carleton	16.8
Stratford	Perth	17.3	Egremont	do	12.5	Clontarf	Renfrew	14.9
Listowel	do	15.4	Durham	do	20.3	Rockliffe	do	21.0
Saugeen	Bruce	14.3	Penetanguishene	Simcoe	14.9	Northcote	do	13.0
Point Clark	do	11.0	Orillia	do	14.2	Deseronto	Hastings	9.8
Granton	Middlesex	14.5	Barrie	do	12.3	Kingston	Frontenac	14.2
Lucan	do	12.4	Parry Sound	Muskoka	17.5	L'Orignal	Prescott	16.0
Ailsa Craig	do	14.6	Beatrice	do	23.9	Augusta	do	15.0
Wilton Grove	do	13.0	Gravenhurst	do	14.7	Merrickville	Grenville	12.3
Delaware	do	13.2	Huntsville	do	18.0	Edwardsburgh	do	11.5
Strathroy	do	16.4	Georgetown	Halton	13.6	Lodi	Stormont	13.2
Birnam	Lambton	16.4	Credit	Peel	11.0	Lunenburg	do	16.3
Sarnia	do	14.3	Hamilton	Wentworth	16.4	Cornwall	do	14.2
Port Stanley	Elgin	13.6						

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TABLE No. XVIII.—Monthly Summary of the average fall of Rain and Snow in the several districts of Ontario for the year 1882.

MONTHS.	W. and S. W.		N. W. and N.		Centre.		E. and N. E.	
	Inches of Rain.	Inches of Snow.	Inches of Rain.	Inches of Snow.	Inches of Rain.	Inches of Snow.	Inches of Rain.	Inches of Snow.
January	1.44	9.5	1.08	20.4	1.22	7.8	0.96	20.7
February	1.66	4.3	0.69	11.7	1.18	5.4	0.95	10.6
March	2.74	13.1	1.96	16.4	1.58	4.6	1.23	12.6
April	1.56	0.7	1.62	1.5	0.94	0.3	1.25	2.2
May	4.77	S	2.14	S	3.59	S	2.94	S
June	3.77	....	3.08	....	3.17	....	3.29	....
July	1.50	....	1.65	....	1.17	....	2.48	....
August	4.05	....	2.80	....	3.74	....	3.04	....
September	1.74	....	2.58	....	1.94	....	3.31	....
October	1.86	....	1.90	....	1.30	....	1.33	....
November	1.19	10.4	1.25	16.1	1.44	8.7	1.30	4.5
December	0.64	23.0	0.43	40.3	1.28	17.7	0.25	23.5
Totals	26.92	61.0	21.18	106.4	22.55	44.5	22.33	74.5

TABLE No. XIX.—Monthly Summary of Sunshine in Ontario during the year 1882, showing the number of hours the sun was above the horizon each Month, the hours of registered Sunshine, and the totals for the year or part of year.

——	Hours of Sun above Horizon.	STATIONS.									
		Windsor.	Woodstock.	Stratford.	Toronto.	St. Catharines.	Lindsay.	Barrie.	Kingston.	Cornwall.	Pembroke.
	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.	Hrs. of s. s.
January	286	.....	65	.....	104	.....	.....	.....	.....	.....	.....
February	291	.....	94	.....	115	.....	.....	.....	.....	.....	.....
March	370	.....	123	.....	149	.....	.....	.....	.....	.....	.....
April	406	.....	299	.....	204	.....	.....	.....	.....	.....	.....
May	461	.....	207	.....	234	.....	.....	.....	.....	.....	.....
June	466	.....	243	.....	277	.....	.....	.....	.....	.....	.....
July	471	.....	263	.....	289	.....	.....	.....	.....	.....	.....
August	435	.....	189	.....	235	182	184	.....	.....	.....	.....
September	376	173	225	185	245	192	232	.....	.....	183	.....
October	340	167	185	186	212	157	194	.....	181	167	.....
November	287	82	85	71	78	53	87	.....	87	81	.....
December	274	35	16	13	28	22	44	22	50	35	.....
Totals	4,463	.....	1,994	.....	2,170	.....	.....	.....	.....	.....	.....

THE WEATHER.

TABLE No. XX.—Comparative Meteorological Register for the seven years 1876–1882 as recorded at the Toronto Observatory, in lat. 43° 39.′ 4 north, and long. 5h. 17m. 33s. west.

	1882.	1881.	1880.	1879.	1878.	1877.	1876.
	°	°	°	°	°	°	°
Mean Temperature	45.42	46.06	45.43	44.16	47.09	46.10	43.98
Difference from average (42 years)	+ 1.21	+ 1.85	+ 1.22	− 0.05	+ 2.88	+ 1.89	− 0.23
Thermic anomaly (lat. 43° 40′)	− 5.60	− 4.96	− 5.59	− 6.86	− 3.93	− 4.92	− 7.04
Highest temperature	89.9	92.7	89.9	89.5	95.4	88.7	92.9
Lowest temperature	− 17.4	− 15.1	− 8.3	− 8.9	− 9.0	− 13.9	− 9.5
Monthly and Annual Ranges	107.3	107.8	98.2	98.4	104.4	102.6	102.4
Mean daily range	15.70	16.61	15.96	17.10	15.11	16.19	15.68
Greatest daily range	36.0	40.9	30.8	34.1	28.6	33.2	42.1
Mean height of the barometer	29.6515	29.6311	29.6359	29.6353	29.5647	29.6346	29.6017
Difference from average (41 years)	+ .0353	+ .0149	+ .0197	+ .0191	− .0515	+ .0184	− .0145
Highest barometer	30.447	30.461	30.323	30.319	30.123	30.352	30.350
Lowest barometer	28.781	28.911	28.800	28.948	28.607	28.712	28.703
Monthly and Annual Ranges	1.666	1.550	1.523	1.371	1.516	1.640	1.647
Mean humidity of the air	74	75	77	76	77	74	76
Mean elasticity of aqueous vapour	0.265	0.283	0.260	0.267	0.293	0.272	0.263
Mean of cloudiness	0.63	0.62	0.62	0.63	0.62	0.60	0.66
Difference from average (28 years)	+ 0.02	+ 0.01	+ 0.01	+ 0.02	+ 0.01	− 0.01	+ 0.06
	°	°	°	°	°	°	°
Resultant direction of the wind	N 47 W	N 50 W	S 80 W	N 72 W	N 63 W	N 62 W	N 51 W
" velocity of the wind	2.11	2.70	2.86	3.18	2.25	1.80	1 98
Mean velocity (miles per hour)	10.42	9.91	10.54	10.36	8.32	8.33	9.29
Difference from average (34 years)	+ 2.86	+ 2.35	+ 2.98	+ 2.80	+ 0.76	+ 0.77	+ 1.73
Total amount of rain	20.587	21.138	30.922	22.515	43.390	21.885	21.063
Difference from average (39 years)	−7.518	−6.967	+2.817	−5.590	+15.285	−6.220	−7.042
Number of days rain	110	123	140	107	132	116	117
Total amount of snow	42.5	57.6	44.0	68.5	51.0	37.3	113.4
Difference from average (39 years)	−27.42	−12.32	−25.92	− 1.42	−18.92	−32.62	+45.48
Number of days of snow	62	64	78	79	56	54	76
Number of fair days	209	191	163	188	202	204	186
Number of Auroras observed	60	23	23	9	7	13	13
Possible to see Aurora (No. of nights)	204	187	198	191	195	206	171
Number of Thunderstorms	28	24	47	37	30	33	19
Number of hours Sunshine	2169.5						
Ratio of possible sunshine	0.46						

POPULATION RETURNS.

TABLE No. XXI.—Showing the Rural and Urban Population of Ontario by the Dominion Census for 1881, and by Municipal Censuses for 1872 and 1877–82; also the area of Municipalities as returned by Assessors in 1882.

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	ESSEX.	Acres.							
2,406	Anderdon, Township	31,272	2,045	2,003	1,962	1,875	1,816	1,637	1,396
4,817	Colchester do	62,084	4,088	3,975	3,861	3,861	3,484	3,314	2,113
3,494	Gosfield do	50,670	3,172	3,345	3,517	3,390	2,772	3,682	2,903
3,260	Maidstone do	38,426	2,986	2,993	3,000	2,691	2,709	2,535	2,065
1,727	Malden do	20,632	1,535	1,531	1,527	1,502	1,529	1,533	1,365
3,552	Mersea do	51,484	3,300	3,143	2,986	2,841	2,702	2,500	2,429
361	Pelée do	9,888	301	330	360	260	.....	.....	.....
2,483	Rochester do	32,356	2,103	2,018	1,933	2,155	1,933	1,918	1,571
4,386	Sandwich E. do	43,005	4,087	3,843	3,600	3,623	3,568	3,361	3,068
2,860	Sandwich W. do	22,961	2,420	2,366	2,311	2,370	2,370	2,360	1,893
4,410	Tilbury W do	40,296	3,760	3,530	3,301	3,123	2,953	2,862	2,152
2,672	Amherstburg, Town	400	2,660	2,543	2,426	2,229	2,145	1,975	1,725
1,143	Sandwich do	2,000	1,049	1,038	1,028	1,071	1,096	1,155	952
6,561	Windsor do	1,867	6,740	6,283	5,826	6,166	6,166	6,394	4,564
556	Belle River, Village	500	625	605	585	603	502	473	.....
863	Kingsville do	470	798	822	845	840	788	.....	.....
1,411	Leamington do	500	1,111	1,152	1,160	1,145	967	958	.....
46,962	Totals	408,811	42,780	41,520	40,228	39,742	38,500	36,658	28,196
	KENT.								
3,239	Camden, Township	38,264	2,844	2,616	2,579	2,633	2,501	2,712	2,762
5,907	Chatham do	84,139	4,895	4,871	5,048	4,813	4,687	4,644	3,465
4,447	Dover do	62,135	3,231	3,429	3,218	3,533	3,416	3,301	2,594
6,410	Harwich do	86,880	5,777	4,999	5,017	4,982	4,875	4,630	5,049
3,962	Howard do	58,329	3,444	4,232	3,708	3,555	3,553	3,310	4,233
3,766	Orford do	48,982	2,617	2,880	2,926	2,915	2,830	2,811	2,530

5,298	Raleigh do	66,755	4,704	4,570	4,313	4,203	4,013	3,854	3,743
1,082	Romney do	21,022	1,003	961	892	913	845	837	642
2,872	Tilbury, E. do	42,689	2,517	2,521	2,477	2,145	2,237	2,004	1,704
1,495	Zone do	22,908	1,255	1,355	1,378	1,155	1,284	1,202	998
965	Bothwell, Town	2,371	890	851	1,029	1,021	931	937	1,004
7,873	Chatham do	1,650	7,739	7,656	7,572	7,265	7,325	6,989	4,816
1,979	Dresden do	642	1,747	1,829	1,592	1,696	1,256	1,271	780
1,538	Ridgetown do	679	1,700	1,429	1,312	1,120	799	803	.....
1,212	Blenheim, Village	485	1,050	1,010	1,341	1,199	1,038	884	.....
740	Thamesville do	500	652	682	753	691	660	625	.....
1,525	Wallaceburg do	509	1,200	1,140	1,270	1,278	938	917	.....
54,310	Totals	538,939	47,265	47,031	46,425	45,117	43,188	41,761	34,320

ELGIN.

4,718	Aldborough, Township	70,064	4,335	4,280	4,247	4,264	4,136	4,000	2,827
4,649	Bayham do	55,971	3,432	3,830	4,589	4,457	4,480	4,455	4,350
1,844	Dorchester, S. do	30,233	1,651	1,716	1,758	1,721	1,663	1,905	2,000
4,290	Dunwich do	62,000	3,629	3,619	3,858	3,697	3,902	3,886	3,043
4,415	Malahide do	62,276	4,013	3,861	3,985	3,863	3,929	4,311	3,926
5,206	Southwold do	72,392	4,399	4,442	4,454	4,598	4,538	4,533	2,961
5,575	Yarmouth do	69,575	4,420	5,393	5,213	5,172	4,906	4,843	4,339
1,540	Aylmer, Village	407	1,498	1,407	1,409	1,466	1,466	1,303	845
674	Port Stanley do	406	698	650	758	755	767	707	.....
555	Springfield do	480	527	474	400	750	.....	.....	.....
528	Vienna do	1,400	490	495	530	520	467	484	566
33,994	Totals	425,204	29,092	30,197	31,201	31,263	30,254	30,427	24,857

NORFOLK.

4,416	Charlotteville, Township	52,155	3,904	3,903	4,002	3,926	3,943	3,827	3,408
2,071	Houghton do	30,289	1,912	1,927	1,976	1,880	1,851	1,856	1,945
3,514	Middleton do	42,845	3,208	3,309	3,351	3,208	3,156	3,077	2,687
4,963	Townsend do	64,390	4,397	4,530	4,609	4,219	4,293	5,393	4,840
5,819	Walsingham do	71,158	4,981	4,956	5,472	5,500	5,330	5,220	4,774
4,913	Windham do	64,958	4,158	4,296	4,060	4,023	4,019	4,208	3,190
2,922	Woodhouse do	34,534	2,495	2,600	2,531	2,444	2,393	3,539	3,465
2,645	Simcoe, Town	800	3,000	2,498	2,493	2,702	3,000	2,949	2,000
1,146	Port Dover, Village	452	1,076	1,065	1,046	1,079	1,081	.....	.....
1,118	Waterford do	470	1,110	1,116	1,052	912	946	.....	.....
33,527	Totals	362,051	30,241	30,194	30,592	29,893	30,012	30,069	26,309

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	HALDIMAND.	Acres.							
1,220	Canboro', Township	21,313	1,085	1,104	1,104	1,020	981	983	972
2,109	Cayuga, North, Township	32,657	1,800	1,838	1,844	1,866	1,867	1,818	1,855
959	Cayuga, South do	13,253	869	900	930	901	892	926	885
1,040	Dunn do	16,065	936	936	910	908	828	868	913
1,799	Moulton do	26,815	1,601	1,546	1,441	1,450	1,529	1,951	1,752
2,863	Oneida do	31,943	2,012	2,021	2,051	2,082	2,123	2,324	2,085
2,217	Rainham do	25,523	1,909	1,927	1,900	1,841	1,863	1,846	1,768
2,545	Seneca do	41,601	2,323	2,469	2,345	2,740	2,758	2,793	2,565
494	Sherbrooke do	4,670	457	465	480	474	461	495	.....
5,854	Walpole do	66,773	5,097	5,051	5,257	5,258	5,159	4,777	4,515
1,242	Caledonia, Village	546	978	1,102	1,152	1,153	1,148	1,171	1,085
830	Cayuga do	1,400	753	758	752	801	841	901	855
1,808	Dunnville do	1,125	1,611	1,591	1,480	1,708	1,670	1,657	1,386
24,980	Totals	283,684	21,431	21,708	21,646	22,202	22,120	22,510	20,636
	WELLAND.								
3,986	Bertie, Township	35,262	3,661	3,460	3,211	3,407	3,425	3,320	3,000
1,318	Crowland, Township	18,848	1,253	1,185	1,166	1,120	1,112	1,149	1,181
4,182	Humberstone, Township	29,766	2,862	3,298	3,495	3,410	2,927	2,141	2,323
2,623	Pelham do	28,800	2,337	2,406	2,436	2,436	2,422	2,353	2,247
3,162	Stamford do	21,411	1,852	2,836	2,618	2,682	2,614	2,545	2,568
2,456	Thorold do	22,590	2,106	2,502	2,488	2,785	2,560	2,342	2,346
2,996	Wainfleet do	44,908	2,400	2,331	2,326	2,200	2,269	2,369	2,003
1,273	Willoughby do	18,818	1,101	1,024	1,086	1,129	1,129	995	1,033
2,347	Niagara Falls, Town	1,033	2,155	2,200	2,186	2,087	2,059	2,070	1,555
2,456	Thorold do	770	2,468	2,471	2,794	2,874	3,050	2,994	1,468
1,870	Welland do	1,130	1,781	1,876	1,972	2,500	2,600	2,466	1,230
661	Chippewa, Village	299	608	631	651	718	814	825	942
722	Fort Erie do	619	562	600	619	766	842	700	900
1,716	Port Colborne, Village	244	1,189	1,520	1,773	1,866	1,661	1,421	1,009
31,771	Totals	224,498	26,335	28,340	28,821	30,010	29,484	27,690	23,805

	Lambton.									
3,360	Bosanquet, Township	53,118	2,831	2,863	2,896	2,882	2,921	3,299		3,420
3,492	Brooke do	69,715	2,933	3,005	3,080	3,039	3,068	3,059		2,332
2,026	Dawn do	38,813	1,943	1,850	1,758	1,648	1,512	1,655		1,061
3,588	Enniskillen do	46,368	2,662	2,576	2,490	2,514	2,500	2,800		1,784
2,791	Euphemia do	37,978	2,364	2,497	2,630	2,636	2,509	2,509		2,218
5,146	Moore do	68,746	4,804	4,919	5,035	5,091	4,796	4,625		4,142
4,495	Plympton do	75,374	4,133	4,165	4,197	4,043	4,013	4,045		4,274
3,583	Sarnia do	39,200	2,027	2,202	2,377	2,363	3,402	3,558		2,684
4,601	Sombra do	68,894	3,188	2,988	2,788	2,739	3,042	2,708		2,515
4,052	Warwick do	70,000	3,597	3,649	3,701	3,674	3,411	3,638		3,563
3,465	Petrolea, Town	2,700	2,906	3,081	3,257	3,094	3,303	4,024		4,239
3,874	Sarnia do	1,478	4,530	4,270	4,010	4,115	4,016	3,156		3,100
830	Alvinston, Village	465	859	750	.....	.....	.....	.....	.....	.....
569	Arkona do	455	571	595	611	686	578	563	.....	.....
1,614	Forest do	500	1,428	1,402	1,377	1,460	1,632	1,470	.....	.....
552	Oil Springs do	1,883	471	514	558	523	537	537		555
1,293	Point Edward, Village	722	1,423	1,389	1,355	1,167	.....	.....	.....	.....
685	Thedford do	490	765	711	656	592	500	.....	.....	.....
1,132	Watford do	400	1,500	1,405	1,310	985	911	911	.....	.....
886	Wyoming do	478	678	764	850	850	800	850	.....	.....
52,034	Totals	577,777	45,592	45,595	44,966	44,131	43,451	43,407		35,887
	Huron.									
4,766	Ashfield, Township	62,575	3,792	3,719	3,628	3,911	3,846	3,819		3,326
2,663	Colborne do	33,490	2,401	2,114	2,175	2,231	2,200	2,147		2,001
3,444	Goderich do	51,716	2,686	2,785	2,752	2,648	2,751	2,821		2,953
4,577	Grey do	53,306	3,887	4,026	4,047	4,207	3,942	3,942		3,355
4,421	Hay do	45,668	3,396	3,486	3,495	3,644	3,543	3,463		3,247
5,616	Howick do	67,252	5,035	5,256	5,193	5,305	5,420	5,348		5,465
3,875	Hullett do	52,206	3,029	3,373	3,378	3,301	3,394	3,401		3,129
4,046	McKillop do	28,725	3,185	3,699	3,682	3,551	3,588	3,632		3,283
3,815	Morris do	55,244	3,207	3,444	3,372	3,293	3,255	3,262		3,428
2,940	Stanley do	42,699	2,306	2,400	2,373	2,383	2,397	2,397		3,330
4,504	Stephen do	45,000	3,820	3,775	3,644	3,826	3,813	4,006		3,124
3,550	Tuckersmith, Township	40,960	3,100	3,248	3,317	3,161	3,128	3,096		3,086
3,010	Turnberry do	31,800	2,292	2,355	2,467	2,527	2,614	2,632		2,732
3,074	Usborne do	42,560	2,890	2,763	2,740	2,753	2,616	2,656		3,007
2,674	Wawanosh, E. do	41,637	2,250	2,301	2,329	2,350	2,345	2,412		2,433
2,795	Wawanosh, W. do	41,125	2,261	2,284	2,352	2,499	2,555	2,555		2,488
2,606	Clinton Town	724	2,502	2,598	2,400	2,457	2,592	2,538		1,928
4,561	Goderich do	895	4,130	4,195	4,328	4,432	4,663	5,003		4,195
2,480	Seaforth do	550	2,356	2,414	2,349	2,348	2,311	2,330		1,522
1,918	Wingham do	625	1,989	1,953	2,038	2,083	2,010	2,072		.....
679	Bayfield, Village	1,700	694	691	632	591	580	780		.....
914	Blyth do	459	1,113	1,161	1,264	1,121	1,150	900		.....
1,280	Brussels do	465	1,282	1,335	1,291	1,429	1,206	1,135		.....

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	HURON.—*Continued.*	Acres.							
1,725	Exeter, Village	1,036	1,587	1,586	1,578	1,682	1,562	1,458	.....
590	Wroxeter do	499	495	568	600	634	650	607	.....
76,526	Totals	745,916	65,745	67,535	67,424	68,369	68,164	68,412	58,032
	BRUCE.								
1,505	Albemarle, Township	25,868	750	794	838	813	666	666	545
3,046	Amabel do	60,133	2,045	1,862	1,680	2,090	2,090	2,090	1,453
3,512	Arran do	53,830	2,974	3,237	3,501	3,573	3,573	3,573	3,034
5,423	Brant do	69,800	4,631	4,687	4,743	4,783	4,799	4,799	4,255
4,236	Bruce do	64,282	3,529	3,650	3,771	3,598	3,830	3,830	3,452
5,909	Carrick do	51,000	4,892	4,940	4,989	5,278	5,177	5,177	4,029
3,807	Culross do	55,025	3,227	3,287	3,347	3,820	3,875	3,875	2,950
1,364	Eastnor, Lindsay and Bury St. Edmunds, T'p.	32,000	1,276	1,197	1,118	953	662	662	.....
3,273	Elderslie, Township	53,853	3,066	3,022	3,038	3,594	3,493	3,493	.....
3,751	Greenock do	60,465	2,892	2,965	3,038	3,099	3,087	3,087	2,977
5,175	Huron do	58,925	4,277	4,259	4,241	4,260	4,267	4,267	2,007
4,506	Kincardine do	58,655	3,335	3,575	3,814	4,230	4,035	4,035	3,283
3,628	Kinloss do	45,557	3,252	3,265	3,279	3,261	3,087	3,087	3,297
2,090	Saugeen do	33,121	1,911	1,841	1,771	1,824	1,841	1,841	2,687
2,876	Kincardine, Town	1,500	2,539	2,593	2,648	2,500	2,500	2,500	2,515
2,604	Walkerton do	1,350	2,652	2,612	2,572	2,396	2,537	2,537	1,535
893	Chesley, Village	500	838	789	740	.....	.....	.....	1,070
1,162	Lucknow do	440	1,260	1,164	1,068	1,117	1,110	1,110	.....
1,154	Paisley do	262	963	943	923	981	1,168	1,168	.....
1,400	Port Elgin do	705	1,470	1,394	1,319	1,450	1,564	1,564	.....
1,141	Southampton, Village	492	1,125	1,116	1,108	942	884	884	840
561	Tara do	500	626	688	750	.....	.....	.....	.....
861	Teeswater do	473	926	918	909	982	915	915	.....
545	Tiverton do	500	536	632	728	850	834	834	.....
796	Wiarton do	669	985	977	968	.....	.....	.....	.....
65,218	Totals	729,905	55,917	56,107	56,901	56,394	55,994	55,994	39,929

	GREY.								
4,576	Artemesia, Township	63,791	3,829	3,817	3,866	3,914	3,674	3,602	3,238
5,472	Bentinck do	76,000	4,647	4,721	4,451	4,234	4,050	4,510	4,105
4,915	Collingwood do	58,500	4,103	4,366	4,095	4,251	4,102	4,102	2,828
2,363	Derby do	36,000	1,959	1,955	2,031	2,040	2,046	2,120	1,691
4,455	Egremont do	71,020	3,716	3,754	3,785	3,780	3,753	3,664	3,270
3,688	Euphrasia do	63,783	3,006	3,031	3,850	3,775	3,740	3,675	2,775
4,001	Glenelg do	65,590	3,786	3,725	3,711	3,705	3,735	3,484	3,348
3,688	Holland do	73,440	3,058	3,120	3,182	3,155	2,864	2,970	3,150
3,449	Keppel do	69,360	3,070	3,102	3,068	3,198	3,032	2,881	1,913
6,140	Normanby do	67,300	5,253	5,815	5,804	5,700	5,400	5,276	3,700
3,512	Osprey do	64,188	3,268	3,494	3,484	3,439	3,465	3,420	2,915
3,402	Proton do	64,340	3,093	2,906	3,053	3,230	2,672	2,120	2,143
972	Sarawak do	10,267	865	846	709	876	755	731	641
4,119	St. Vincent do	62,900	3,672	3,349	3,652	3,586	3,615	3,635	4,769
4,143	Sullivan do	66,720	3,464	3,527	3,564	3,558	3,464	3,341	3,075
4,293	Sydenham do	70,497	4,045	3,860	3,756	3,822	3,795	3,814	3,573
1,059	Durham, Town	1,300	1,082	1,033	984	965	886	870	847
1,866	Meaford do	800	1,904	1,790	1,649	1,628	1,736	1,634	.....
4,426	Owen Sound, Town	6,125	4,511	4,309	4,584	4,548	4,320	4,207	3,819
70,539	Totals	991,921	62,331	62,520	63,278	63,404	61,104	60,056	51,800
	SIMCOE.								
2,885	Adjala, Township	44,769	2,215	2,210	2,234	2,215	2,260	2,100	1,808
4,666	Essa do	67,543	3,826	3,826	3,708	3,708	4,000	3,833	2,838
3,141	Flos do	46,233	2,451	2,383	2,353	2,229	2,148	1,936	1,655
2,994	Gwillimbury, W., Township	28,820	2,917	2,871	2,676	2,438	2,483	2,511	2,407
5,499	Innisfil, Township	67,313	4,346	4,624	4,440	4,616	4,800	5,038	4,797
3,632	Medonte do	57,335	2,932	2,755	2,777	2,771	2,613	2,348	1,935
6,971	Nottawasaga, Township	86,930	5,319	5,339	5,262	5,332	5,352	6,415	5,425
3,097	Orillia & Matchedash, Township	65,416	2,365	2,354	2,326	2,348	2,311	2,236	1,906
4,566	Oro, Township	69,855	4,015	4,119	3,968	3,809	3,872	4,238	4,329
2,802	Sunnidale do	28,853	2,543	2,628	2,674	2,535	2,535	2,380	1,467
2,993	Tay do	33,310	1,965	1,904	1,564	1,594	1,634	1,962	867
5,325	Tecumseth do	65,300	4,388	4,390	4,393	4,458	4,572	4,451	4,170
3,736	Tiny do	59,659	2,804	2,832	2,619	2,588	2,556	2,686	2,705
1,921	Tossorontio do	44,287	1,270	1,223	1,176	1,141	1,096	1,067	1,266
2,879	Vespra do	54,133	2,520	2,548	2,657	2,217	2,324	2,390	1,839
4,854	Barrie, Town	2,100	4,536	4,611	4,818	4,802	4,515	4,238	2,848
4,445	Collingwood, Town	4,400	4,762	4,134	4,315	4,336	4,094	3,596	2,889
2,910	Orillia do	640	2,900	2,900	2,900	2,749	2,559	2,519	1,632
1,099	Alliston, Village	500	1,168	985	1,140	1,120	1,072	609	.....
1,176	Bradford do	1,700	926	1,025	1,124	1,322	1,350	1,164	933
1,095	Midland do	469	1,264	953	806	799	918	.....	.....
1,089	Penetanguishene, Village	1,256	1,151	980	809	939	543	502	.....
1,028	Stayner, Village	505	1,009	1,008	1,006	830	978	1,069	.....
74,803	Total	831,306	63,592	62,602	61,745	60,896	59,645	60,288	47,716

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	MIDDLESEX.	Acres.							
3,108	Adelaide, Township	44,125	3,119	2,980	2,832	2,786	2,774	2,724	2,532
2,940	Biddulph do	39,259	2,560	2,700	2,615	2,449	2,613	2,523	2,741
5,230	Caradoc do	60,531	4,137	3,880	3,940	3,958	3,836	4,049	3,621
2,674	Delaware do	23,209	1,687	1,687	1,854	1,676	1,570	1,703	1,564
4,056	Dorchester, N., Township	50,843	4,293	3,887	4,082	4,239	4,251	4,109	3,155
3,023	Ekfrid, Township	50,461	2,721	2,806	2,798	2,859	2,720	2,685	2,800
3,092	Lobo do	47,246	2,738	2,894	2,815	2,685	2,725	2,729	2,779
9,599	London do	99,151	8,750	9,503	9,645	8,917	7,946	6,936	10,622
4,178	McGillivray, Township	62,421	3,526	3,685	3,763	3,578	3,645	3,587	1,227
2,192	Metcalfe do	36,149	2,100	2,195	2,223	2,037	2,006	2,142	2,305
2,673	Mosa do	44,738	2,641	2,790	2,708	2,278	2,278	1,949	2,774
3,562	Nissouri, W. do	49,500	3,134	3,550	3,426	3,475	3,000	2,983	3,000
7,892	Westminster do	63,000	7,707	6,834	6,371	6,255	6,097	5,824	5,150
2,195	Williams, E. do	38,113	1,955	1,881	1,881	1,753	1,716	1,953	2,256
2,339	Williams, W. do	34,088	1,925	1,988	1,946	1,916	1,972	2,134	2,625
3,890	London, East, Town	754	4,254	3,663	3,651	3,507	3,328	3,048	.....
3,817	Strathroy do	2,280	3,493	3,640	3,421	3,500	3,351	3,310	3,006
872	Ailsa Craig, Village	444	730	838	899	923	874	711	.....
801	Glencoe do	476	837	801	740	727	605	532	.....
1,601	London West do	500	1,679	1,603	1,578	1,329	1,140	1,188	.....
976	Lucan do	445	873	900	1,070	1,071	1,012	1,100	.....
546	Newbury do	500	560	547	534	560	546	513	.....
1,539	Parkhill do	500	1,471	1,522	1,561	1,604	1,626	1,626	.....
540	Wardsville do	475	415	474	560	540	475	500	489
73,335	Totals	749,208	67,305	67,248	66,913	64,622	62,106	60,558	52,646
	OXFORD.								
2,089	Blandford, Township	29,188	1,811	1,855	1,861	1,587	1,626	1,727	1,671
5,937	Blenheim do	67,116	4,924	5,086	4,880	5,028	4,735	4,440	5,432
4,486	Dereham do	63,270	3,863	3,976	3,831	3,730	3,717	3,754	3,785
3,325	Nissouri, E., do	46,466	2,628	2,612	2,735	2,649	2,643	2,758	3,466

2,632	Norwich, N. do	33,837	2,124	2,129	2,192	2,124	2,189	2,094	2,699
3,360	Norwich, S. do	34,249	2,682	2,615	2,646	2,535	2,558	2,551	2,669
2,313	Oxford, E. do	34,196	2,096	2,081	2,087	2,184	2,122	2,184	2,165
1,645	Oxford, N. do	20,896	1,533	1,461	1,400	1,392	1,342	1,400	1,411
2,694	Oxford, W. do	25,458	2,072	2,263	2,085	2,484	2,300	2,426	2,336
4,591	Zorra, E. do	56,544	4,142	3,774	3,652	3,567	3,447	3,621	4,258
3,430	Zorra, W. do	55,032	2,840	2,742	2,843	2,826	2,742	2,742	3,187
4,318	Ingersoll, Town	1,722	4,353	4,949	5,188	5,157	5,029	5,015	4,649
1,939	Tilsonburgh, Town	1,800	1,834	1,827	1,891	1,780	1,606	1,680	1,445
5,373	Woodstock do	1,275	5,223	5,399	5,382	5,128	5,069	5,298	4,445
616	Embro, Village	1,335	505	510	595	600	541	537	489
1,411	Norwich do	500	1,265	1,316	1,021	1,101	980	944	.....
50,159	Totals	472,884	43,895	44,595	44,289	43,872	42,646	43,171	44,107

BRANT.

6,555	Brantford, Township	71,566	5,545	5,537	5,421	5,239	5,263	5,099	5,258
5,466	Burford do	64,624	4,955	4,854	4,861	4,822	4,953	4,812	4,714
3,490	Dumfries, S. do	46,813	3,347	3,448	3,474	3,465	3,121	3,037	2,859
939	Oakland do	10,517	875	875	931	884	900	820	986
1,739	Onondaga do	20,432	1,369	1,431	1,414	1,438	1,491	1,620	1,613
3,173	Paris, Town	685	3,070	3,062	3,098	3,103	2,952	3,090	2,721
21,362	Totals	214,637	19,161	19,207	19,199	18,951	18,680	18,478	18,151

PERTH.

3,244	Blanchard, Township	46,142	2,812	2,967	3,121	2,955	2,970	3,242	.....
3,489	Downie do	49,075	3,187	2,928	3,095	3,170	3,346	3,137	3,161
2,722	Easthope, N. do	43,120	2,362	2,390	2,509	2,549	2,544	2,474	2,903
2,244	Easthope, S. do	23,259	1,778	1,829	1,829	1,884	1,825	1,676	1,787
3,275	Ellice do	42,407	2,647	2,804	2,625	2,727	2,605	2,544	2,500
4,421	Elma do	62,509	3,603	3,752	3,914	3,733	3,793	3,744	3,023
2,708	Fullarton do	39,772	2,399	2,469	2,528	2,459	2,560	2,520	2,539
3,394	Hibbert do	40,908	2,779	3,130	3,257	3,052	3,144	3,169	3,018
3,355	Logan do	45,524	2,717	2,813	3,003	3,055	2,732	2,789	2,758
2,998	Mornington do	49,489	3,250	3,586	3,968	3,799	3,848	3,757	3,508
3,655	Wallace do	49,456	3,036	2,979	3,046	3,246	3,179	2,901	3,042
2,688	Listowel, Town	1,700	2,409	2,462	2,696	2,663	2,625	3,140	1,100
2,284	Mitchell do	2,000	2,244	2,377	2,435	2,307	2,366	2,221	1,577
3,415	St. Marys do	2,714	3,442	3,432	4,593	4,593	4,968	4,977	3,574
8,239	Stratford do	2,835	9,000	8,954	8,912	8,885	8,645	8,442	6,101
562	Milverton, Village	478	512	669	770	.....	.....	.....	.....
53,693	Totals	501,388	48,177	49,541	52,301	51,167	51,150	50,733	40,591

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	WELLINGTON.	Acres.							
3,916	Arthur, Township	63,465	3,416	3,554	3,739	3,807	3,599	3,514	3,332
3,611	Eramosa do	43,757	3,229	3,391	3,269	3,223	3,194	3,263	3,258
*5,121	Erin do	70,200	3,677	3,952	3,909	4,250	4,238	4,464	4,160
3,620	Garafraxa, W. do	46,125	3,124	3,216	3,150	2,973	3,150	2,970	2,810
2,793	Guelph do	36,497	2,616	2,823	2,656	2,579	2,738	2,702	2,530
3,347	Luther do	66,431	3,122	2,918	3,136	2,832	2,764	2,549	1,575
4,551	Maryborough do	54,582	3,464	3,669	3,533	3,358	2,783	3,076	3,927
4,443	Minto, Township	68,170	3,798	3,919	3,898	3,903	3,946	3,911	4,390
2,474	Nichol do	26,563	2,176	2,157	2,205	2,219	2,182	2,260	2,411
5,024	Peel do	73,858	4,116	4,382	4,107	4,169	4,095	4,095	4,886
1,958	Pilkington do	29,860	1,750	1,792	1,819	1,837	1,831	1,948	2,014
3,985	Puslinch do	58,338	3,283	3,258	3,466	3,370	3,300	3,470	4,007
1,772	Harriston, Town	995	1,803	1,712	1,737	1,500	1,356	1,275	750
2,170	Mt. Forest do	1,399	2,304	2,194	2,171	1,909	1,903	1,796	1,400
1,828	Palmerston do	919	1,727	1,743	1,759	1,555	1,601	1,601	.....
1,257	Arthur, Village	1,020	1,145	1,265	1,264	1,273	1,198	1,099	459
722	Clifford do	437	664	664	660	683	821	846	.....
587	Drayton do	461	904	789	764	692	696	751	.....
1,387	Elora do	900	1,478	1,390	1,510	1,476	1,490	1,612	1,506
†	Erin do	425	503	406	.....	.....	.....	.....	.....
1,733	Fergus do	875	1,661	1,732	1,783	1,688	1,701	1,741	1,550
56,299	Totals	645,277	49,960	50,926	50,535	49,296	48,586	48,943	44,965
	WATERLOO.								
3,848	Dumfries, N., Township	44,418	3,359	3,583	3,283	3,409	3,341	3,161	3,312
7,594	Waterloo do	81,607	6,852	6,997	6,661	6,437	6,301	6,379	6,513
5,752	Wellesley do	66,024	5,002	4,778	5,016	4,968	5,086	4,987	4,852
5,358	Wilmot do	57,300	5,134	4,888	4,910	5,015	4,939	4,889	4,793
5,524	Woolwich do	53,956	5,075	5,193	5,040	5,090	4,966	5,046	4,807
4,054	Berlin, Town	2,885	3,906	4,079	3,911	3,946	3,893	3,780	2,907
5,187	Galt do	739	5,215	4,983	4,736	4,509	4,527	4,499	4,013

2,066	Waterloo do	2,700	2,103	2,012	1,959	1,901	1,899	1,966	1,539
698	Hespeler, Village	491	789	642	597	634	605	602	635
1,240	New Hamburg do	883	1,238	1,151	1,135	1,118	1,277	1,207	940
1,419	Preston do	1,094	1,430	1,305	1,378	1,474	1,424	1,478	1,374
42,740	Totals	312,097	40,103	39,611	38,626	38,501	38,258	37,994	35,685
	DUFFERIN.								
2,914	Amaranth, Township	58,443	2,391	2,504	2,617	2,617	2,553	2,371	1,245
2,635	Garafraxa, E. do	40,014	2,169	2,159	2,150	2,009	2,120	2,158	2,101
3,099	Melancthon do	74,000	2,506	2,514	2,522	2,436	2,500	2,465	1,997
4,097	Mono do	68,089	3,618	3,510	3,401	3,520	3,442	3,662	3,363
4,211	Mulmur do	67,212	3,978	3,836	3,695	3,699	3,414	3,272	2,871
2,847	Orangeville, Town	1,800	2,413	2,523	2,633	2,453	2,416	2,480	1,487
733	Shelburne, Village	500	708	657	606	598	.....	.....	.....
20,536	Totals	310,058	17,783	17,703	17,624	17,332	16,445	16,408	13,064
	LINCOLN.								
2,164	Caistor, Township	32,643	1,928	1,916	1,905	1,907	1,907	1,907	1,873
2,399	Clinton do	24,760	2,017	2,091	2,165	2,782	2,782	2,782	2,491
3,001	Gainsborough do	39,557	2,612	2,615	2,618	3,016	3,016	3,016	2,546
2,218	Grantham do	18,797	2,087	2,083	2,079	2,451	2,451	2,451	3,845
2,416	Grimsby do	32,736	2,390	2,327	2,261	3,123	3,123	3,123	2,634
1,995	Louth do	18,000	1,690	1,664	1,638	1,893	1,893	1,893	1,578
2,004	Niagara do	22,239	1,719	1,832	1,944	2,093	2,093	2,093	1,808
1,441	Niagara, Town	600	1,393	1,445	1,497	1,587	1,443	1,443	1,437
685	Beamsville, Village	547	694	692	691	.....	.....	.....	.....
692	Grimsby do	515	654	645	636	.....	.....	.....	.....
1,798	Merritton do	486	1,697	1,704	1,710	1,800	1,800	1,800	.....
1,129	Port Dalhousie do	400	1,007	1,000	992	1,800	1,500	1,500	971
21,942	Totals	191,280	19,888	20,014	20,139	22,252	22,008	22,008	19,183
	WENTWORTH.								
4,726	Ancaster, Township	45,470	4,213	4,465	4,460	4,386	4,196	4,206	3,446
3,525	Barton do	14,130	3,425	3,270	3,476	2,674	2,711	2,813	2,400
5,230	Beverley do	69,000	4,890	5,100	5,118	4,537	4,621	4,989	4,583
1,814	Binbrook do	26,202	1,511	1,643	1,629	1,536	1,532	1,545	1,710
‡3,598	Flamboro', E. do	33,643	2,359	2,432	2,491	2,482	3,090	2,921	2,940
3,461	Flamboro', W. do	28,000	3,235	3,364	3,341	3,222	3,232	3,455	3,155

* Including Erin Village. † Included in Erin Township. ‡ Including Waterdown Village.

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	WENTWORTH.—*Continued.*	Acres.							
1,977	Glanford, Township	23,491	1,867	1,847	1,887	1,893	1,980	1,879	1,845
2,951	Saltfleet do	27,917	2,614	2,587	2,368	2,259	2,551	2,570	2,250
3,709	Dundas, Town	559	4,021	3,668	3,530	3,536	3,648	3,611	3,232
*....	Waterdown, Village	400	750	754	758	742	.....	.....	.....
30,991	Totals	268,803	28,885	29,130	29,058	27,267	27,561	27,989	25,561
	HALTON.								
4,998	Esquesing, Township	63,248	4,448	4,585	4,742	4,774	4,726	4,775	5,688
2,800	Nassagaweya do	42,714	2,708	2,748	2,809	2,710	2,705	2,762	2,551
3,340	Nelson do	45,474	3,030	3,039	3,089	3,089	3,228	2,833	2,594
4,382	Trafalgar do	67,225	4,125	4,384	4,334	4,337	4,231	4,256	3,826
1,302	Milton, Town	400	1,125	1,192	1,258	1,272	1,266	1,067	820
1,710	Oakville do	1,300	1,711	1,709	1,708	1,764	1,843	1,667	1,556
848	Acton, Village	491	838	805	775	752	739	743	.....
1,068	Burlington do	480	1,024	1,046	1,071	1,025	995	980	.....
1,471	Georgetown do	1,033	1,467	1,562	1,612	1,608	1,616	1,630	1,317
21,919	Totals	222,365	20,526	21,070	21,398	21,331	21,349	20,713	18,352
	PEEL.								
3,872	Albion, Township	55,934	3,186	3,189	3,172	3,295	3,346	3,465	3,441
5,310	Caledon do	68,300	3,617	3,568	3,954	3,903	3,839	3,895	3,687
5,476	Chinguacousy do	80,000	4,747	5,005	5,002	5,154	5,210	4,992	5,276
5,873	Toronto do	64,821	5,169	5,343	5,253	5,368	5,428	5,296	5,183
1,363	Toronto Gore do	19,000	1,203	1,245	1,187	1,253	1,262	1,261	1,341
2,920	Brampton, Town	1,600	3,169	2,966	3,128	3,004	3,009	2,718	2,428
606	Bolton, Village	475	549	560	559	781	790	787	795
755	Streetsville do	514	706	655	693	675	617	643	584
26,175	Totals	290,644	22,346	22,531	22,948	23,433	23,501	23,057	22,735

	York.								
2,976	Etobicoke, Township	29,143	2,787	2,728	2,694	2,615	2,580	2,576	2,408
2,482	Georgina do	30,944	2,245	2,232	2,116	2,116	2,082	1,948	1,676
4,143	Gwillimbury, E. do	52,931	3,725	3,892	3,639	3,814	3,836	3,800	3,240
2,151	Gwillimbury, N. do	30,561	1,823	1,953	1,770	1,718	1,624	1,447	1,968
6,664	King do	85,116	5,623	5,655	5,417	5,601	5,815	5,612	5,614
6,375	Markham do	67,421	5,355	5,600	5,388	5,536	5,466	5,674	6,635
4,208	Scarboro' do	42,349	3,896	4,082	3,753	4,104	4,236	4,180	4,096
†6,828	Vaughan do	65,902	4,966	5,230	5,515	5,625	5,539	5,475	5,410
4,529	Whitchurch do	60,538	4,119	4,117	4,048	4,148	4,093	3,973	3,835
‡12,748	York do	63,156	10,319	10,939	11,153	10,981	11,298	10,365	7,114
1,540	Aurora, Town	1,160	1,456	1,480	1,344	1,381	1,146	1,203	1,201
2,006	Newmarket do	698	1,704	1,704	1,698	1,786	1,697	1,906	1,424
786	Brockton, Village	469	713	702	.....	.....	.....	.....	.....
580	Holland Landing do	1,636	536	553	616	584	542	508	569
954	Markham do	477	937	949	919	889	895	872	.....
1,170	Parkdale do	487	1,854	1,183	897	776	.....	.....	.....
867	Richmond Hill do	500	798	797	749	699	681	659	.....
866	Stouffville, Village	440	841	805	863	755	754	718	.....
§	Weston do	500	800	.....	.....	.....	.....	.....	.....
‖	Woodbridge do	470	872	.....	.....	.....	.....	.....	.....
4,825	Yorkville do	500	5,211	5,056	4,899	4,739	4,371	4,202	2,285
66,698	Totals	535,398	60,580	59,657	57,478	57,867	56,655	55,118	47,475
	Ontario.								
4,378	Brock, Township	65,068	4,139	4,156	4,174	4,140	4,155	4,931	4,685
3,237	Mara do	50,467	2,767	2,940	2,833	2,744	2,728	2,603	2,218
6,883	Pickering do	71,186	6,368	6,035	6,123	6,109	6,209	6,001	6,525
1,370	Rama do	24,009	942	913	977	995	970	822	577
4,949	Reach do	58,949	4,385	4,385	4,335	4,535	4,503	4,324	4,812
2,563	Scott do	47,766	2,286	2,414	2,480	2,493	2,562	2,554	2,557
768	Scugog do	9,980	639	625	553	591	653	627	630
2,542	Thorah do	30,432	2,118	2,420	2,283	2,136	1,963	2,046	1,992
4,081	Uxbridge do	51,571	3,686	3,748	3,863	3,656	3,836	3,781	4,186
3,417	Whitby, E., Township	32,564	3,456	3,267	3,220	3,284	3,205	3,366	3,309
2,946	Whitby, W. do	30,078	2,790	2,852	2,815	2,783	2,884	2,769	2,950
3,992	Oshawa, Town	2,400	4,177	4,196	4,352	4,475	4,548	4,180	2,805
3,140	Whitby do	3,800	2,969	2,946	3,349	3,397	3,412	3,346	2,963
922	Cannington, Village	434	917	903	919	887	975	.....	.....
1,800	Port Perry do	576	1,773	1,687	1,753	1,869	1,948	1,899	.....
1,824	Uxbridge do	428	1,781	1,674	1,608	1,616	1,655	1,655	.....
48,812	Totals	479,708	45,193	45,161	45,637	45,710	46,206	44,904	40,209

* Included in East Flamboro' Township. † Including Woodbridge Village. ‡ Including Weston Village. § Included in York Township.
‖ Included in Vaughan Township.

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	DURHAM.	Acres.							
2,357	Cartwright, Township	35,779	2,218	2,255	2,014	1,978	2,060	2,065	1,830
3,479	Cavan do	62,683	3,128	3,213	3,249	4,452	4,571	4,405	4,398
5,169	Clarke do	67,772	4,892	5,096	4,767	4,445	4,547	4,494	4,576
5,465	Darlington do	67,836	4,968	5,044	5,170	4,990	5,312	5,472	5,536
4,522	Hope do	63,092	3,997	3,946	3,710	3,813	3,740	3,548	3,447
3,976	Manvers do	65,156	3,412	3,319	3,139	2,954	3,129	3,277	3,165
3,504	Bowmanville, Town	3,000	3,567	3,462	3,255	3,237	3,155	3,243	3,199
5,585	Port Hope do	1,040	5,440	5,382	5,324	5,546	5,515	5,974	5,352
1,148	Millbrook, Village	500	1,084	1,062	1,119	.....	.....	.....	.....
1,060	Newcastle do	1,906	943	1,038	1,038	1,180	1,167	1,148	871
36,265	Totals	368,764	33,649	33,817	32,785	32,595	33,196	33,626	32,374
	NORTHUMBERLAND.								
1,471	Alnwick, Township	16,478	1,083	1,220	1,016	980	1,107	1,055	968
3,470	Brighton do	45,680	2,854	2,849	2,821	2,890	2,753	3,145	2,938
3,481	Cramahe do	45,849	3,114	3,181	3,080	3,147	2,800	3,000	2,952
5,401	Haldimand do	75,976	5,087	5,185	5,185	4,527	4,527	4,797	4,410
5,155	Hamilton do	61,978	4,596	4,649	4,397	4,481	4,834	4,913	5,345
1,148	Monaghan, S., Township	18,355	900	1,072	1,077	924	959	1,028	914
3,560	Murray do	47,936	3,182	3,070	3,166	3,063	3,081	3,090	3,075
3,768	Percy do	50,328	3,419	3,529	3,321	3,263	3,168	3,101	3,275
3,783	Seymour do	67,482	3,476	3,293	3,358	3,411	3,276	3,405	3,832
4,957	Cobourg, Town	2,904	5,210	5,164	5,118	5,178	5,177	5,278	4,170
1,547	Brighton, Village	2,584	1,481	1,515	1,550	1,557	1,586	1,545	1,192
1,418	Campbellford do	900	1,602	1,355	1,292	1,060	1,080	1,144	.....
1,079	Colborne do	1,200	939	974	1,009	1,029	935	1,036	894
885	Hastings do	551	806	802	778	725	735	772	.....
41,123	Totals	438,201	37,749	37,858	37,168	36,235	36,018	37,309	33,965

	Prince Edward.								
3,451	Ameliasburg, Township	42,727	2,995	3,084	3,106	3,004	3,012	3,167	3,169
1,573	Athol do	23,364	1,331	1,384	1,446	1,468	1,280	1,321	1,334
3,704	Hallowell do	43,615	3,124	3,217	3,342	3,446	3,515	3,463	3,487
2,192	Hillier do	31,311	1,791	1,842	1,921	1,985	1,954	2,075	1,919
1,700	Marysburgh, N., do	23,598	1,443	1,548	1,541	1,530	1,506	1,443	1,467
2,205	Marysburgh, S., do	23,404	1,953	1,886	1,944	1,927	1,836	1,970	1,539
2,646	Sophiasburgh do	41,485	2,108	2,200	2,085	2,173	2,128	2,150	2,246
2,975	Picton, Town	552	2,863	2,833	2,828	2,855	2,869	2,842	2,391
598	Wellington, Village	1,462	523	537	550	543	484	502	494
21,044	Totals	231,518	18,131	18,531	18,763	18,871	18,584	18,933	18,046
	Lennox and Addington.								
737	Adolphustown, Township	11,510	620	649	679	632	734	641	665
621	Abinger, Denbigh, Ashby and Effingham, Tps.	26,601	552	536	520	572	400	377	324
1,089	Amherst Island, Township	14,689	1,093	1,117	1,141	1,074	1,140	1,091	1,073
990	Anglesea and Kaladar, Townships	40,568	932	895	858	858	875	796	589
5,134	Camden, E., Township	92,000	4,040	4,142	4,243	4,678	4,433	4,133	3,230
3,961	Ernesttown, Township	61,649	3,243	3,354	3,464	3,439	3,511	3,638	3,694
1,720	Fredericksburg, N., Township	22,902	1,640	1,583	1,526	1,592	1,531	1,475	1,377
1,340	Fredericksburg, S. do	20,505	1,250	1,195	1,139	1,264	963	1,094	1,139
3,241	Richmond do	49,343	2,676	2,477	2,278	2,550	2,620	2,868	2,731
2,591	Sheffield do	67,255	2,218	2,243	2,267	2,247	2,377	2,144	2,034
3,680	Napanee, Town	1,200	3,323	3,313	3,302	3,101	2,894	3,127	2,757
546	Bath, Village	1,980	637	589	542	550	520	526	527
834	Newburgh, Village	3,200	797	760	723	700	716	665	644
26,484	Totals	413,342	23,021	22,853	22,682	23,257	22,714	23,475	20,784
	Frontenac.								
486	Barrie, Township	13,318	458	419	380	395	364	329	331
2,019	Bedford do	43,699	1,560	1,568	1,577	1,604	1,635	1,567	1,510
685	Clarendon and Miller, Townships	26,816	660	642	624	680	640	495	345
1,322	Hinchinbrook, Township	37,626	1,101	1,155	1,209	1,181	997	924	861
479	Howe Island do	8,021	400	396	391	384	364	373	419
1,149	Kennebec do	30,828	966	935	904	919	955	818	696
3,739	Kingston do	66,000	2,418	2,716	3,014	2,976	2,721	2,700	2,795
2,394	Loughborough do	46,000	1,904	1,855	1,807	2,124	2,060	1,909	2,585
829	Olden do	36,511	715	723	741	792	732	677	533
959	Oso do	38,066	767	779	791	783	671	800	468
1,005	Palmerston and Canonto, Townships	56,571	728	739	750	714	893	1,013	372
3,352	Pittsburgh, Township	48,107	2,653	2,760	2,867	2,928	2,867	3,078	2,902
2,452	Portland do	51,000	2,303	2,300	2,296	2,231	2,254	2,098	2,043

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	FRONTENAC.—*Continued.*	Acres.							
2,811	Storrington, Township	42,634	2,200	2,217	2,234	2,246	2,239	2,080	2,600
2,383	Wolfe Island do	30,533	1,955	1,917	1,880	1,999	2,105	1,985	2,181
495	Garden Island, Village	64	493	502	511	577	489	668	727
1,734	Portsmouth, do	500	1,066	999	932	861	865	874	1,112
28,293	Totals	576,294	22,347	22,627	22,908	23,394	21,851	22,388	22,480
	LEEDS AND GRENVILLE.								
5,096	Augusta, Township	75,205	4,525	4,418	4,483	4,709	4,732	4,669	4,150
3,500	Bastard and Burgess Townships	56,280	2,810	2,665	2,476	2,679	2,986	2,831	2,915
1,999	Crosby, N., Township	39,512	1,633	1,680	1,693	1,706	1,715	1,713	1,665
1,968	Crosby, S. do	35,177	1,816	1,865	1,834	1,938	1,915	1,915	1,870
*5,431	Edwardsburg do	69,091	4,182	4,143	4,145	4,732	4,715	4,718	4,367
4,905	Elizabethtown do	77,371	4,201	4,214	4,471	4,320	4,320	4,183	4,042
1,121	Elmsley, S. do	22,758	930	960	967	935	961	1,012	1,073
1,329	Escott, Front, do	23,360	1,228	1,034	1,034	1,200	1,218	1,218	1,101
1,022	Gower, South, do	21,729	921	842	883	944	925	867	993
2,593	Kitley do	49,420	2,219	2,261	2,325	2,275	2,332	2,345	2,451
3,587	Leeds and Lansdowne, Front, Townships	57,949	2,919	3,028	3,125	3,150	3,003	3,066	2,892
2,653	Leeds and Lansdowne, Rear, do	50,975	2,199	2,401	2,286	2,286	2,428	2,393	2,213
3,785	Oxford on Rideau, Township	59,145	3,139	3,118	3,333	3,390	3,484	3,453	3,366
2,401	Wolford, Township	46,611	1,877	1,900	1,945	1,984	1,984	2,044	2,189
1,778	Yonge, Front, do	35,050	1,547	1,493	1,652	1,502	1,540	1,549	1,412
2,103	Yonge and Escott, Rear, Townships	29,157	1,937	1,985	2,100	2,102	2,088	1,967	1,648
7,609	Brockville, Town	1,240	7,504	7,473	7,441	7,468	6,597	6,543	5,409
2,999	Prescott, do	640	2,893	2,930	2,968	2,872	2,693	2,747	2,574
†.	Cardinal, Village	500	605	546	800	.....	.....	.....	.....
2,871	Gananoque do	1,223	3,007	2,736	2,781	2,856	2,812	2,812	2,377
1,188	Kemptville do	356	899	987	1,136	1,149	1,125	1,119	767
819	Merrickville, Village	715	726	719	781	819	849	884	701
418	Newboro' do	808	423	387	459	400	419	435	.....
61,175	Totals	754,272	54,140	53,785	55,118	55,416	54,841	54,463	50,085

	Dundas.								
4,692	Matilda, Township	62,602	3,728	3,785	3,841	3,840	4,026	4,000	3,821
3,719	Mountain do	50,800	3,070	3,098	3,033	3,094	3,104	3,151	2,727
4,671	Williamsburgh do	53,000	4,022	4,186	3,956	4,069	3,828	4,200	3,864
4,796	Winchester do	57,000	4,058	4,032	3,838	3,923	3,864	3,727	3,680
1,001	Iroquois, Village	800	954	902	872	918	945	900	653
1,719	Morrisburgh do	1,200	1,708	1,704	1,797	1,806	1,531	1,558	967
20,598	Totals	225,402	17,550	17,707	17,337	17,650	17,298	17,536	15,712
	Stormont.								
5,436	Cornwall, Township	61,900	3,583	3,580	3,510	3,384	3,448	3,603	3,656
3,493	Finch do	51,238	2,640	3,035	2,879	2,886	3,048	2,881	2,697
5,796	Osnabruck do	62,010	4,880	4,856	4,790	4,880	4,674	4,674	4,950
4,005	Roxborough do	69,245	3,822	3,727	3,712	3,763	3,508	3,384	3,063
4,468	Cornwall, Town	653	4,316	4,190	4,154	3,867	3,652	3,459	3,577
23,198	Totals	248,046	19,241	19,388	19,045	18,777	18,330	18,001	17,943
	Glengarry.								
6,354	Charlottenburgh, Township	80,256	5,228	5,473	5,474	5,807	5,689	5,744	4,173
5,491	Kenyon do	78,316	4,593	4,278	4,171	4,096	4,477	4,320	4,258
4,851	Lancaster do	56,733	4,045	4,164	4,082	4,187	4,000	4,000	3,685
5,525	Lochiel do	71,624	4,674	4,480	4,500	4,500	4,368	4,368	3,750
22,221	Totals	286,929	18,540	18,395	18,227	18,590	18,534	18,432	15,866
	Prescott.								
3,208	Alfred, Township	40,476	2,503	2,454	2,209	2,203	2,022	1,821	1,730
1,751	Caledonia do	27,200	1,502	1,440	1,429	1,369	1,297	1,209	958
5,082	Hawkesbury, E. do	56,531	3,796	3,898	4,001	3,733	3,677	3,431	4,067
2,360	Hawkesbury, W. do	22,857	1,796	1,888	1,965	1,990	2,003	1,960	1,255
1,162	Longueuil do	16,886	972	984	997	1,063	907	883	1,294
3,997	Plantagenet, N. do	43,267	3,602	3,446	3,500	3,612	3,407	3,171	2,903
2,524	Plantagenet, S. do	36,591	2,217	2,192	2,159	2,076	2,012	1,931	1,356
1,920	Hawkesbury, Village	5,400	1,344	1,457	1,452	1,481	1,582	1,650	1,426
853	L'Orignal do	4,019	801	764	736	685	639	639	.....
22,857	Totals	253,227	18,533	18,523	18,448	18,212	17,546	16,695	14,989

* Including Cardinal Village. † Included in Edwardsburg Township.

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1883.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	RUSSELL.	Acres.							
1,676	Cambridge, Township	32,947	1,613	1,471	1,339	1,400	1,228	1,205	1,140
4,411	Clarence do	57,600	4,297	4,059	3,889	3,882	3,592	3,717	2,560
3,535	Cumberland do	63,941	2,642	2,509	2,506	2,650	2,721	2,708	2,737
3,458	Russell do	39,323	2,813	2,833	2,786	2,669	2,788	2,748	2,342
13,080	Totals	193,811	11,365	10,872	10,520	10,601	10,329	10,378	8,779
	CARLETON.								
3,378	Fitzroy, Township	56,274	2,651	2,798	2,448	2,656	2,440	2,500	1,733
6,254	Gloucester do	80,000	4,764	5,000	5,150	5,150	5,000	5,000	3,843
3,381	Goulbourn do	65,000	2,911	3,235	3,200	3,340	3,090	3,040	2,620
2,481	Gower, N. do	33,095	2,394	2,388	2,266	2,149	2,302	2,283	2,206
2,534	Huntley do	52,298	2,326	2,393	2,457	2,481	2,438	2,466	2,351
1,318	March do	27,328	1,163	1,122	1,038	1,042	1,042	1,053	972
2,090	Marlborough do	60,000	1,855	1,852	1,861	2,110	1,991	2,000	2,071
8,044	Nepean do	60,450	6,994	7,058	6,776	7,002	7,031	6,500	4,345
4,753	Osgoode do	89,419	3,995	3,995	3,799	3,921	3,885	3,685	3,675
1,024	Torbolton do	22,036	868	1,118	926	920	888	845	620
995	New Edinburgh, Village	80	965	867	897	894	890	907	588
439	Richmond do	1,425	347	381	364	377	452	477	388
36,691	Totals	547,405	31,173	32,207	31,182	32,042	31,449	30,756	25,412
	RENFREW.								
2,383	Admaston, Townships	57,698	2,201	2,126	2,225	2,228	2,054	2,103	1,786
759	Algona, S., do	22,070	621	662	604	529	498	503	642
1,912	Alice and Fraser, Townships	41,195	1,552	1,607	1,441	1,557	1,504	1,517	1,344

1,126	Bagot and Blithefield do	43,328	962	952	1,027	1,062	1,034	1,072	1,169
1,797	Bromley do	44,764	1,623	1,623	1,646	1,577	1,630	1,588	1,317
574	Brougham do	13,649	575	490	530	612	420	300	500
1,270	Brudenell and Lynedoch, Township	30,708	1,038	1,185	1,162	1,213	1,470	1,457	931
1,893	Grattan do	50,298	1,510	1,523	1,488	1,412	1,466	1,694	1,388
614	Griffith and Matawatchan do	17,649	516	569	570	553	560	500	273
1,417	Hagarty and Jones, Sherwood, Richards and Burns, Townships	43,394	1,392	1,210	1,365	1,281	1,280	1,200	.....
953	Head, Clara, and Maria, Townships	5,871	270	391	331	269	282	150	140
1,510	Horton do	36,090	1,252	1,262	1,304	1,220	1,217	1,173	1,066
3,092	McNab do	57,718	3,006	2,984	2,927	2,857	2,725	2,852	2,608
683	Pembroke do	7,491	621	630	584	552	589	563	466
689	Petewawa and McKay do	19,575	472	547	587	593	545	553	362
785	Radcliffe and Raglan do	23,149	619	619	660	711	711	711	.....
699	Rolph, Wylie, and Buchanan, Townships	20,656	525	577	538	530	574	493	421
2,131	Ross, Township	47,969	2,213	2,080	1,697	1,423	1,778	1,817	1,545
626	Sebastopol do	18,624	537	572	537	549	530	502	544
1,055	Stafford do	20,363	951	973	987	966	915	784	701
3,220	Westmeath, Township	67,288	2,627	2,614	2,608	2,546	2,737	2,597	2,273
2,406	Wilberforce and Algona, N., Townships	57,305	1,883	2,002	2,003	2,115	2,027	2,175	1,674
2,820	Pembroke, Town	658	3,000	2,804	2,886	2,824	2,865	2,741	1,895
2,147	Arnprior, Village	950	2,000	1,948	1,844	1,769	1,820	1,639	1,710
1,605	Renfrew do	2,182	1,414	1,483	1,282	1,199	1,112	1,306	838
88,166	Totals	750,642	33,380	33,433	32,833	32,147	32,343	31,990	25,593

LANARK.

2,960	Bathurst, Township	58,617	2,617	2,677	2,736	2,806	2,830	2,828	2,803
1,928	Beckwith do	57,070	1,750	1,791	1,832	1,849	1,794	2,035	1,617
1,287	Burgess, N., Township	32,309	1,058	1,034	1,010	1,154	1,190	1,181	1,162
2,528	Dalhousie, Sherbrooke, N., and Lavant, Tps	85,894	2,471	2,458	2,444	2,391	2,438	2,416	2,307
767	Darling, Township	40,396	647	694	742	702	677	690	724
2,378	Drummond do	56,933	2,137	2,188	2,240	2,134	2,168	2,058	1,685
1,319	Elmsley, N., do	27,435	1,141	1,130	1,118	1,156	1,138	1,152	1,310
2,029	Lanark do	53,506	1,717	1,747	1,777	1,832	1,835	1,834	1,942
2,683	Montague do	61,739	2,126	2,158	2,190	2,156	2,166	2,068	2,528
2,284	Pakenham do	52,049	1,804	1,792	1,780	1,773	1,730	1,780	1,759
2,899	Ramsay do	60,000	2,203	2,377	2,550	2,546	2,538	2,546	2,347
948	Sherbrooke, S. do	37,113	742	782	823	834	796	758	642
2,684	Almonte, Town	650	2,632	2,631	2,633	2,516	2,529	2,570	1,797
2,467	Perth do	1,000	2,730	2,755	2,780	2,803	2,845	2,745	2,853
1,975	Carleton Place, Village	550	1,915	1,800	1,688	1,669	1,834	1,873	1,041
752	Lanark do	2,620	689	666	642	705	654	678	633
2,087	Smith's Falls do	600	2,003	1,980	1,957	1,804	1,800	1,853	1,382
33,975	Totals	628,481	30,382	30,660	30,942	30,830	30,962	31,065	28,532

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES-	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	VICTORIA.	Acres.							
903	Bexley, Township	21,585	711	844	659	692	677	559	431
1,446	Carden and Dalton, Townships	40,843	1,202	995	1,203	1,051	1,191	1,346	966
3,778	Eldon, Township	58,446	2,888	3,008	3,296	3,238	3,005	3,079	2,441
2,876	Emily do	59,299	2,434	2,382	2,554	2,489	2,529	2,470	3,175
3,094	Fenelon do	49,429	2,806	2,811	2,733	2,722	2,652	2,842	3,528
957	Laxton, Digby and Longford, Townships	21,749	801	796	794	789	771	758	762
5,531	Mariposa, Township	73,760	5,397	5,216	4,910	4,795	4,809	4,981	5,002
3,358	Ops, do	55,964	2,766	2,804	2,781	2,895	2,856	3,077	3,148
1,509	Somerville do	33,979	1,187	1,359	1,282	1,432	1,342	1,173	887
2,474	Verulam do	52,403	2,161	2,195	2,230	2,009	2,109	2,112	2,325
5,080	Lindsay, Town	1,600	5,120	5,365	5,324	5,521	5,591	5,374	4,076
750	Bobcaygeon, Village	500	713	710	717	669	752	714	.....
1,155	Fenelon Falls do	509	1,050	1,017	965	921	1,038	957	.....
744	Omemee do	475	650	689	774	821	835	803	.....
33,655	Totals	470,541	29,886	30,191	30,222	30,044	30,157	30,245	26,741
	PETERBOROUGH.								
1,918	Asphodel, Township	37,814	1,741	1,687	1,792	1,846	1,958	2,629	3,080
1,965	Belmont and Methuen, Townships	50,098	1,580	1,643	1,740	1,626	1,652	1,553	1,451
1,381	Burleigh, Anstruthers and Chandos, Townships.	67,689	1,279	1,307	1,296	1,070	1,084	941	649
2,864	Douro, Township	36,822	1,926	1,862	2,146	2,129	1,923	1,654	2,145
2,149	Dummer do	45,068	1,936	2,012	1,980	1,839	1,777	1,759	1,821
1,137	Ennismore do	17,483	1,002	1,033	1,077	1,023	884	1,038	867
787	Galway and Cavendish, Townships	20,221	648	716	692	534	574	501	498
1,111	Harvey, Township	36,044	954	934	979	1,021	932	947	631
912	Monaghan N. do	13,442	743	740	742	771	870	837	1,152
4,013	Otonabee do	63,470	3,607	3,739	3,766	3,685	3,525	3,480	3,299
3,301	Smith do	55,820	2,729	2,732	2,772	2,777	2,734	2,732	3,170
6,812	Peterborough, Town	1,282	7,010	6,752	6,495	6,606	6,825	6,875	4,717
1,266	Ashburnham, Village	959	1,292	1,299	1,205	1,251	1,245	1,296	1,129

†	Lakefield do	507	981	987	976	911	816	902	.....
853	Norwood do	433	760	767	750	813	821	.....	.....
30,472	Totals	447,152	28,188	28,210	28,408	27,902	27,620	27,144	24,609
	HALIBURTON.								
371	Anson and Hinden, Townships	11,918	329	322	342	342	237		
497	Cardiff, Township	20,366	499	515	483	389	339		
1,087	Clyde, Burton, Dudley, Dysart, Harcourt, Harburn, Eyre, Guilford and Havelock, Townships	23,491	891	914	1,013	926	861		
902	Glamorgan and Monmouth, Townships	32,146	883	864	789	695	583		
586	Lutterworth, Township	18,677	488	491	515	525	582		
1,110	Minden do	27,868	1,019	1,075	1,148	993	1,099		
807	Snowdon do	21,284	848	540	540	722	599		
551	Stanhope, Sherbourne and McClintock, Townships	15,480	479	495	486	473	463		
5,911	Totals	171,230	5,436	5,216	5,316	5,065	4,763		
	HASTINGS.								
935	Carlow and Mayo, Townships	28,020	814	869	925	939	814	725	640
1,514	Elzevir and Grimsthorpe do	36,596	1,115	1,132	1,150	1,208	1,199	1,111	1,266
970	Faraday and Dungannon do	44,628	936	920	904	853	690	572	390
4,559	Hungerford, Township	82,100	3,810	4,005	4,200	4,465	4,500	4,540	4,195
2,555	Huntington do	48,929	2,345	2,377	2,408	2,674	2,624	2,750	2,593
855	McClure, Wicklow and Bangor, Townships	20,421	580	612	644	598	592	381	257
1,072	Herschel and Monteagle do	33,660	985	982	979	871	872	872	588
3,182	Madoc, Township	70,410	2,823	2,700	2,576	2,516	2,473	2,858	2,509
2,084	Marmora and Lake, Townships	116,907	1,667	1,711	1,755	1,849	1,742	1,632	1,575
3,692	Rawdon, Township	62,682	2,898	2,910	2,923	2,912	2,968	3,151	4,096
4,842	Sidney do	68,723	3,465	3,698	3,930	3,812	3,667	3,774	3,780
4,922	Thurlow do	53,300	4,271	4,392	4,513	4,530	4,500	4,400	4,340
1,550	Tudor, Wollaston, Cashel and Limerick Tps.	62,404	1,446	1,501	1,557	1,255	1,268	1,212	876
6,162	Tyendinaga, Township	79,327	4,910	4,759	4,609	4,647	4,556	4,781	5,885
3,042	Trenton, Town	1,880	3,100	2,726	2,353	2,183	2,189	2,522	1,790
1,670	Deseronto, Village	209	1,535	1,331	1,128	1,160	1,004	1,008	765
1,065	Madoc do	593	1,049	1,063	1,077	865	658	.....	.....
874	Stirling do	800	834	814	795	791	785	677	676
45,545	Totals	811,579	38,583	38,502	38,426	38,228	37,101	36,966	36,221

* Including Lakefield Village. † Included in Douro Township.

TABLE No. XXI.—POPULATION RETURNS.—*Continued.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	DISTRICT OF MUSKOKA.	Acres							
1,604	Brunel, Township	40,418	634	624	666	696	618	550	75
	Stephenson do	32,847	877	863	920	962	848	766	471
1,114	Cardwell and Watt, Townships	22,766	993	1,001	1,073	937	954	803	678
2,315	Chaffey, Perry, Bethune, and Proudfoot, T'ps.	.....	.....	.....	.....	.....	.....	.....	.....
1,794	Draper and Oakley, Townships	48,887	1,163	1,237	1,073	850	844	1,078	.....
	Ryde, Township	21,588	607	623	525	516	441		691
687	Franklin and Sinclair, Townships	.....	.....	.....	.....	.....	.....	.....	.....
*2,135	Macaulay, Township	32,520	890	890	937	948	797	735	954
756	McLean and Ridout, Townships	31,151	695	700	677	721	571	571	77
1,116	Medora and Wood do	42,970	664	675	627	612	498	464	302
801	Monck, Township	26,781	576	621	680	625	548	520	150
816	Morrison do	17,654	660	646	636	621	621	552	570
1,135	Muskoka do	25,141	867	828	771	678	521	798	419
†....	Bracebridge, Village	500	1,086	1,127	1,023	986	902	851	.....
1,015	Gravenhurst do	482	1,127	938	976	883	883	.....	.....
15,288	Totals	343,705	10,839	10,773	10,584	10,035	9,046	7,688	4,387
20,320	DISTRICT OF ALGOMA	184,760	.....	.....	7,920	7,200	6,000		
2,090	DISTRICT OF NIPISSING	.....	.....	.....	3,500	1,980	1,650		
11,916	DISTRICT OF PARRY SOUND	131,051	.....	.....	3,044	2,760	2,300		
	CITIES.								
9,516	Belleville	1,600	10,021	10,038	9,987	9,991	9,112	9,112	7,361
9,616	Brantford	1,781	10,865	10,555	10,587	10,587	10,792	10,631	8,435
9,890	Guelph	3,210	9,854	10,057	10,260	10,072	9,918	9,680	7,189
35,961	Hamilton	2,400	36,946	35,977	35,009	34,268	33,511	33,511	27,959
14,091	Kingston	1,688	14,611	14,260	13,929	14,358	14,072	13,253	11,597

19,746	London	1,252	20,411	20,176	19,941	19,666	19,186	18,808	16,709
27,412	Ottawa	1,829	25,558	24,791	24,025	24,015	25,000	24,500	22,189
9,631	St. Catharines	2,400	9,576	10,026	10,475	10,475	11,079	10,143	8,503
8,367	St. Thomas	1,450	9,644	8,853	8,063	7,217	6,446	5,954	2,906
86,415	Toronto	4,867	81,372	76,934	75,110	73,813	70,867	67,386	57,020
	RECAPITULATION.								
1,345,369	Total Rural Population	19,277,188	‡ 1,112,848	‡ 1,124,999	1,139,638	1,135,662	1,124,526	‡ 1,105,880	(‡ 1,038,379
128,833	do Village do	98,574	128,948	125,338	123,132	118,932	110,762	102,487	46,772
215,490	do Town do	98,538	214,460	211,264	211,980	210,259	207,411	206,019	151,578
230,645	do City do	22,477	228,858	221,667	217,386	214,462	209,983	202,978	169,868
1,920,337	Totals	19,496,777	1,685,114	1,683,268	1,692,136	1,679,315	1,652,682	1,617,364	1,406,597
	TOTALS BY COUNTIES.								
46,962	Essex	408,811	42,780	41,520	40,228	39,742	38,500	36,658	28,196
54,310	Kent	538,939	47,265	47,041	46,425	45,117	43,188	41,761	34,320
33,994	Elgin	425,204	29,092	30,197	31,201	31,263	31,254	30,427	24,857
33,527	Norfolk	362,051	30,241	30,194	30,592	29,893	30,012	30,069	26,309
21,980	Haldimand	283,684	21,431	21,708	21,646	22,202	22,120	22,510	20,636
31,771	Welland	224,498	26,335	28,340	28,821	30,010	29,484	27,690	23,805
52,034	Lambton	577,777	45,592	45,595	44,966	44,131	43,451	43,407	35,887
76,526	Huron	745,916	65,745	67,535	67,424	68,369	68,164	68,412	58,032
65,218	Bruce	729,905	55,917	56,407	56,901	56,394	55,994	55,994	39,929
70,539	Grey	991,921	62,331	62,520	63,278	63,404	61,104	60,056	51,860
74,803	Simcoe	831,306	63,592	62,602	61,745	60,896	60,645	60,238	47,716
73,335	Middlesex	749,208	67,305	67,248	66,913	64,622	62,106	60,558	52,646
50,159	Oxford	472,884	43,895	44,595	44,289	43,872	42,646	43,171	44,107
§ 21,362	Brant	244,637	19,161	19,207	19,199	18,951	18,680	18,478	18,151
53,693	Perth	501,388	48,177	49,541	52,301	51,167	51,150	50,733	40,591
56,299	Wellington	645,277	49,960	50,926	50,535	49,296	48,586	48,943	44,965
42,740	Waterloo	312,097	40,103	39,611	38,626	38,501	38,258	37,994	35,685
20,536	Dufferin	310,058	17,783	17,703	17,624	17,332	16,445	16,408	13,064
21,942	Lincoln	191,280	19,888	20,014	20,139	22,252	22,008	22,008	19,183
30,991	Wentworth	268,803	28,885	29,130	29,058	27,267	27,561	27,989	25,561
21,949	Halton	222,365	20,526	21,070	21,398	21,331	21,349	20,713	18,352
26,175	Peel	290,644	22,346	22,531	22,948	23,433	23,501	23,057	22,735
66,698	York	535,398	60,580	59,657	57,478	57,867	56,655	55,118	47,475
48,812	Ontario	479,708	45,193	45,161	45,637	45,710	46,206	44,904	40,209
36,265	Durham	368,764	33,649	33,817	32,785	32,595	33,196	33,626	32,374
41,123	Northumberland	438,201	37,749	37,858	37,168	36,235	36,018	37,309	33,965
21,044	Prince Edward	231,518	18,131	18,531	18,763	18,871	18,584	18,933	18,046
26,484	Lennox and Addington	413,342	23,021	22,853	22,682	23,257	22,714	23,475	20,784
28,293	Frontenac	576,294	22,347	22,627	22,908	23,394	22,851	22,388	22,480
61,175	Leeds and Grenville	754,272	54,140	53,785	55,118	55,416	54,841	54,463	50,085

* Including Bracebridge Village. † Included in Macaulay, Township. ‡ Exclusive of Algoma, Nipissing and Parry Sound.
§ Exclusive of the population of the Indian Reserve at Tuscarora, 2,891.

TABLE No. XXI.—POPULATION RETURNS.—*Concluded.*

Dominion Census, 1881.	MUNICIPALITIES.	Area Occupied, 1882.	MUNICIPAL CENSUSES.						
			1882.	1881.	1880.	1879.	1878.	1877.	1872.
	TOTALS BY COUNTIES.—*Continued.*	Acres.							
20,598	Dundas	225,462	17,550	17,707	17,337	17,650	17,298	17,536	15,712
23,198	Stormont	248,046	19,241	19,388	19,045	18,777	18,330	18,001	17,943
22,221	Glengarry	286,929	18,540	18,395	18,227	18,590	18,534	18,432	15,866
22,857	Prescott	253,227	18,533	18,523	18,448	18,212	17,546	16,695	14,989
13,080	Russell	193,811	11,365	10,872	10,520	10,601	10,329	10,378	8,779
36,691	Carleton	547,405	31,173	32,207	31,182	32,042	31,449	30,756	25,412
38,166	Renfrew	750,642	33,380	33,433	32,833	32,147	32,343	31,990	25,593
33,975	Lanark	628,481	30,382	30,660	30,942	30,830	30,962	31,065	28,532
33,655	Victoria	470,541	29,886	30,191	30,222	30,044	30,157	30,245	26,741
30,472	Peterboro'	447,152	28,188	28,210	28,408	27,902	27,620	27,144	24,609
5,911	Haliburton	171,230	5,436	5,216	5,316	5,065	4,763	.....	.....
45,545	Hastings	811,579	38,583	38,502	38,426	38,228	37,101	36,966	36,221
15,288	Muskoka	343,705	10,839	10,773	10,584	10,035	9,046	7,688	4,387
20,320	Algoma	.....	.....	.....	7,920	7,200	6,000	.....	.....
2,090	Nipissing	.....	.....	.....	3,500	1,980	1,650	.....	.....
11,916	Parry Sound	.....	.....	.....	3,044	2,760	2,300	.....	.....
230,645	Cities	22,477	228,858	221,667	217,386	214,462	209,983	202,978	169,868
†1,920,337	Totals	*19,496,777	*1,685,114	*1,683,268	1,692,136	1,679,315	1,652,682	*1,617,364	*1,406,597

* Exclusive of Algoma, Nipissing, and Parry Sound.

† Exclusive of the population of the Indian Reserve at Tuscarora, 2 891.

AN ACT TO ESTABLISH A BUREAU OF INDUSTRIES.

[*Assented to 10th March, 1883.*]

HER MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. This Act may be cited as "The Bureau of Industries Act."

2. There shall be attached to the Department of the Commissioner of Agriculture a Bureau, to be styled "The Bureau of Industries," for collecting, tabulating and publishing industrial information for public purposes, and the said Commissioner shall be charged with the direction thereof.

3. It shall be the duty of the Commissioner to institute inquiries and collect useful facts relating to the agricultural, mechanical and manufacturing interests of the Province, and to adopt measures for disseminating or publishing the same in such manner and form as he finds best adapted to promote improvement within the Province, and to encourage immigration from other countries; and (amongst other things) to procure and publish early information relating to the supply of grain, breadstuffs and live stock in the other Provinces of the Dominion, in Great Britain, and in the United States and other foreign countries in which the Province finds a market for its surplus products; and as to the demand therefor; and he shall submit to the Legislature, within thirty days of the opening of each session, a detailed and succinct report of his proceedings.

4. The Lieutenant-Governor may appoint a Secretary of the Bureau, who shall be known as the "Secretary of the Bureau of Industries;" and may also appoint such other officers as may be necessary for the proper conduct of the Bureau.

5. It shall be the duty of the secretary, under the instructions of the Commissioner, o conduct all correspondence of the Bureau; to send to the proper officers and bodies of whom such service is required the schedules, with instructions, approved by the Commissioner for the collection of facts and information relating to the agricultural and other industries of the Province; to receive and tabulate the information collected and obtained; to publish the same monthly or oftener during the growing season; to prepare at the close of each year a general report to the Commissioner; to compile annually from the departmental records of the Province, and from other available records, a tabular abstract of facts relating to land, trade, government, population, and other subjects; and generally to perform all work within the sphere of the Bureau as he may from time to time be directed by the Commissioner.

6. The officers of all societies, institutes and associations organized under the Agricultural and Arts Act, and of all municipal councils, school boards and public institutions, and all public officers of this Province, shall promptly answer all official communications from the said Bureau, shall from time to time collect and tabulate facts according to instructions to be furnished them, shall make diligent efforts to supply correct information on all questions submitted to them, and generally shall act, as far as practicable, upon the recommendations of the Commissioner; and any officer of any such society, institute, association, council, school board or public institution, making a false return of information, or refusing or wilfully neglecting to answer any question, or to fill up, tabulate and return official schedules according to instructions and within the prescribed times, or to furnish any information relating to the industries of the Province, when required so to do either by the Commissioner or by the secretary of the Bureau, shall for every such offence incur a penalty of forty dollars, which shall be recoverable by any person suing for the same before any court of competent jurisdiction, and shall be paid to Her Majesty for the use of this Province.

7. The Commissioner of Agriculture, with the approval of the Lieutenant-Governor in Council, may make such arrangements as he deems expedient with the Government of the Dominion for the collection and transmission of information on the agricultural, manufacturing and other interests of the Province, or for obtaining for the use of the Province such information as may have been collected by the Department of the Minister of Agriculture.

8. All collectors and officers employed in collecting data for the Bureau of Industries shall be entitled to receive one copy each of the publications and reports of the said Bureau.

9. Sections numbered five, six, eight, nine, ten, and eleven of the Agriculture and Arts Act are hereby repealed.

CIRCULARS TO CORRESPONDENTS AND OTHERS.

CIRCULAR No. 1.—TO ELECTORAL DIVISION AGRICULTURAL SOCIETIES.

TORONTO, March 30, 1882.

This Bureau is making arrangements with the Meteorological Service for the supply of Weather Reports for the Province, to be published from time to time throughout the year. The Reports will consist chiefly of records of Temperature, Sunshine and Rainfall,—conditions on which so largely depend the health and growth of farm crops and of vegetation generally.

Temperature and Sunshine vary but slightly over large areas, and observations made at comparatively few stations will suffice for the whole Province. Rainfall, on the other hand, is very unequally distributed, and during the growing season especially local showers are of almost daily occurrence.

It is desirable, therefore, to collect the Rain Reports from a large number of stations, and to carry out this object the Meteorological Service agrees to furnish the Rain Gauges if the Bureau will procure the appointment of suitable men to take charge of them and make monthly reports to the Central Meteorological Office.

The work is very simple. It consists in examining the Gauge at a certain hour each day, measureing the Rainfall (if any), and making entry thereof in a blank to be supplied for the purpose. Full instructions will be given for placing the instrument, taking measures and making records.

Kindly confer with the Directors of your Society and send me at your earliest convenience the name and address of some good man in your electoral district who will undertake this work; or, if the area is large, it would be better to give the names of two or three, so selected as best to cover the whole ground.

The fact that the minimum of Rainfall is on unbroken plains and the maximum in hilly districts, along the valleys of rivers and in the neighborhood of large bodies of water, will serve as a valuable guide in the locating of rain-gauge stations.

Each observer will be entitled to a copy of this Bureau's Reports, as provided for in the 8th section of the Act.

P.S.—Rain Reports are now received from the following stations in Ontario: Barrie, Brampton, Beatrice, Brantford, Conestoga, Cornwall, Credit, Egremont, Elora, Fitzroy Harbour, Granton, Goderich, Gravenhurst, Galt, Georgina, Gore Bay, Guelph, Hamilton, Huntsville, Kingston, Kincardine, Lindsay, Lucan, Listowel, Little Current, Lakefield, Manitowaning, McKellar, Mount Forest, Michipicoten Island, Norwood, Nottawasaga Island, Northcote, Owen Sound, Orillia, Port Dover, Port Stanley, Parry Sound, Prince Arthur's Landing, Pembroke. Point Clark, Peterborough, Point Pelee, Pre:qu' Isle, Rockliffe, Saugeen, Simcoe, Stratford, Strathroy, Toronto, Woodstock, Windsor, Welland, Zurich, Zion.

CIRCULAR No. 2.—TO CORRESPONDENTS.

TORONTO, April 15, 1882.

In carrying on the work for which this Bureau has been established, it is of the first consequence to get early, full and trustworthy information. The market prices of meats and breadstuffs for the next twelve months will largely depend on the present condition of Live Stock and of the Fall Wheat crop. What is that condition? It is locally known in every section of the Province; every farmer can answer the question for his own neighborhood, or his own Township, but beyond these limits few men have any definite knowledge.

There has hitherto been no means of gathering the local information, making a careful summary of the whole, and using it in the public interest. If such work has been attempted at all it has been by the dealers in food supplies, and in their own interest only; producers and consumers have been selling and buying in the dark, so far at least as knowing anything of the extent of supply and demand in the country.

It is one of the chief objects of the Bureau of Industries to collect facts and statistics relating to food supplies from every section of the Province, and to abstract, tabulate and publish the same in the common interest of producers, dealers and consumers. A second object, hardly less important, is the procuring of similar information from other agricultural countries, and from countries in which the Province usually finds a market for its surplus products. And having such data it will not be difficult to form an intelligent opinion upon the tendency of prices in the ruling markets of the world.

The first Report will be published early in May, and others will follow from time to time during the growing season. They will be mailed promptly to every daily and weekly newspaper in the Province, and every correspondent of the Bureau will be entitled to a copy.

With the active co-operation of the classes chiefly concerned, there is no reason to doubt that in this way valuable public service may be rendered. Producers, dealers and consumers may be brought nearer

together ; sudden fluctuations in prices may be averted ; the country's annual surplus or deficit of products may be ascertained, and its resources, capabilities and progress in material wealth may be actually gauged.

You are invited to assist in the work of the Bureau by acting as one of its correspondents, and reporting the facts as to your own locality. Brief answers to the questions herewith sent will be valuable when aggregated with similar information from all parts of the Province.

State whether you report for a Township, County or Electoral District, enclose and seal in the accompanying envelope, and mail punctually on the 25th inst. By an arrangement with the Post Office Department the reports and schedules of the Bureau go through the mails *free of postage*.

I need utter only one word of caution : If you can't answer a question, *don't*. Inaccurate information is misleading and mischievous.

A copy of the Act establishing the Bureau of Industries is appended.

REPORT ON CROPS AND LIVE STOCK.

For the (Township, County, or District) of , April 25th, 1882.

1. What is the general condition of Fall Wheat ?
2. What is its condition on the various soils ?
3. To what extent, if at all, has it been injured by Winter or Spring frosts ?
4. To what extent, if at all, by worms or insects ?
5. Has any Wheat land been ploughed up ? Or is any likely to be ? To what extent ?
6. Is Winter Rye grown ? What is its condition ?
7. What is the condition of the Clover crop, and how has it been affected by Winter or Spring frosts ?
8. What is the condition of Live Stock—Horses, Cattle, Sheep and Pigs ?
9. Has any disease appeared among them ; and if so, of what nature, and what have been its effects ?
10. Was there a sufficiency or a scarcity of fodder supply throughout the Winter ?
11. What progress has been made with Spring work ? When did ploughing and seeding begin ?
12. In what stage is vegetation, and what is the appearance of the Fruit trees ? How has the Winter affected Fruit trees ?
13. Is any considerable quantity of Wheat in farmers' hands above reserves for home consumption ?
14. Is any considerable quantity of Hay and Oats ?
15. Are any considerable numbers of fat and store cattle ?
16. General Remarks.

CIRCULAR No. 3.—TO TOWNSHIP CLERKS.

This Circular asked for reports on subjects in the foregoing schedule in a condensed form, for the population of the township as given in the Assessor's returns, the number of farms, acres occupied, acres cleared, and acres in fall wheat.

CIRCULAR No. 4.—TO FARMERS.

TORONTO, May 15, 1882.

The Return asked for in the Schedules below is for the use of the Bureau of Industries, organized by an Act of the Ontario Legislature and attached to the Department of the Commissioner of Agriculture. The objects of the Bureau, as stated in the third clause of the Act, are as follows :

"It shall be the duty of the Commissioner to institute inquiries and collect useful facts relating to the agricultural, mechanical, and manufacturing interests of the Province, and to adopt measures for disseminating or publishing the same in such manner and form as he finds best adapted to promote improvement within the Province, and to encourage immigration from other countries ; and (amongst other things) to procure and publish early information relating to the supply of grain, breadstuffs, and live stock in the other Provinces of the Dominion, in Great Britain, and in the United States and other foreign countries in which the Province finds a market for its surplus products ; and as to the demand therefor ; and he shall submit to the Legislature, within thirty days of the opening of each session, a detailed and succint report of his proceedings."

Another clause of the Act provides that the Secretary of the Bureau shall receive and tabulate the information relating to Crops, Live Stock, etc., and "publish the same monthly or oftener during the growing season." In this way farmers may know the extent of supply and demand in the whole country as well as in their own neighborhood, and whether prices are likely to rule high or low. They may know, in a word, when to sell and when to keep.

The information you are asked to give will be treated in confidence by the Bureau. It will be published only in bulk with other Returns from your Township. *It has nothing whatever to do with taxes, or the assessment of property*, and the Township Assessor cannot use it.

Fill up each Schedule in plain figures, and as accurately as you can. In giving the "estimated produce" of a crop—that is, the quantity it promises to yield—let it be for the whole crop, and not at a rate per acre. The nearer you are to accuracy in everything the more useful and valuable will the Reports of the Bureau be.

If you occupy a leased farm, fill up the heading "Leased Farms" in Schedule VII.

COMPLETE ALL THE ENTRIES BY THE 31st OF MAY INST., SIGN YOUR NAME, AND RETURN THE PAPER ON THAT DAY TO THE TEACHER OF YOUR SCHOOL. The Teacher is expected to make a Report for the School Section, and to send all the Schedules to this Bureau.

CIRCULAR No. 5.—TO TEACHERS.

TORONTO, May 15, 1882.

In sending to you the Schedules for collecting the Agricultural Statistics of your School Section, and asking you to assist in compiling them, I am carrying out the intention of the Legislative Assembly of Ontario, as well as that of the Government.

The Legislature has dealt in a liberal spirit with the Schools and School Teachers of Ontario.

It has for many years made large grants of money, to be apportioned to School Sections and paid wholly to Teachers every midsummer as part of their salary.

It has been generous in the giving of holidays (ninty days in all each year, including Saturdays) during which salaries go on.

It has established and now supports institutions for the special education and training of School Teachers.

And it has enacted laws for the adequate protection of Teachers in all their rights and privileges.

For those and other reasons the Legislature felt that it might very fairly invite the co-operation of School Teachers with the Bureau of Industries in collecting and compiling the Agricultural Statistics of the country.

The Schedules enclosed are accordingly sent to you for distribution, and the blank form lettered "A" for entering the Returns when they are made to you by the farmers.

Send by the pupils of the School one Schedule to every farmer in your Section who occupies five acres of land or upwards. If any farmer in the Section has no children attending the School, then send a Schedule to him by a child of the nearest neighbour, who should call for it when filled and return it to you.

When the Schedules are filled and returned to you (which should be not later than Wednesday, the 31st of May inst.), enter them at once in the form lettered "A." The first column is for the consecutive number of farmers, the second for their names, and the other columns for the statistical figures in the same order as in the Schedules. On the second page the consecutive number in the first column is the same as on the first page, and the returns as entered are those of the farmer whose number it is.

Having entered all the Schedules, add up each column for totals, fold up your Summary Return and the Schedules in the addressed wrapper enclosed herewith, and send the parcel to the Post Office—if possible, not later than Saturday, 3rd June prox. It will come *postage free*.

If your Section is partly in one Township and partly in another, enter the returns for each Township separately, and make the totals separate also.

If any farmer refuse to fill his Schedule, enter his name on the Summary sheet, giving his Post Office address.

If an insufficient number of Schedules have not been sent for your School Section, please notify me at once by post card, stating the additional number which you require.

Hoping to receive your cordial assistance in this work, which is designed to promote the material interests of the whole country, and especially the interests of the farming class, etc.

CIRCULAR No. 6.—TO CORRESPONDENTS.

TORONTO, June 22, 1882.

The Bureau will publish early in July a Report giving the acreage of grain crops in the Province, with remarks on their condition and promise. The acreage returns are now being compiled, and will be ready in a few days. I will be greatly obliged if you will answer the questions in the margin below relating to the appearance of the crops in your Township or County, as far as known to you by inquiry or observation. Mail the return in the enclosed envelope by 1st July, and if not sealed it will come postage free. Do not omit (as sometimes happens) to fill in the name of your Township and County, and to give your own name and Post Office address. A copy of the Report will be sent to every correspondent as soon as published.

Report on Crops for the Township of County of July 1, 1882.

1. What is the condition of Fall Wheat? Of Spring Wheat?
2. What is the condition of Oats, Peas, Barley, and other Spring Grains?
3. How have Grain Crops been affected by the weather—by rain, frost, temperature, etc.?
4. What is the condition of Meadows?
5. General Remarks on the state of Vegetation, time of Haying and Harvesting, promise of the Fruit Crop, etc.

CIRCULAR No. 7.—TO CORRESPONDENTS.

Toronto, July 25th, 1882.

The special features of the August Report of the Bureau will be (1) a survey of the crops, (2) the progress of harvest operations, and (3) statistics of the live stock of the Province. The statistics are now being compiled from returns made by the school teachers, and the Bureau depends on the assistance of its regular correspondents for information on the other subjects, specified in detail on the margin below. Brief notes on the hay, grain, fruit and root crops in your township, on the progress made in hay-making and harvesting, on the quality of wheat and spring grains, and on the state in which hay and cereals have been secured, will be of great value in preparing the Report. You are also asked to report on the state of corn, beans and roots; on the quantity and quality of apples, peaches, plums, grapes, and other fruits; and on the condition of pastures and live stock, with especial reference to the dairying interest and the meat supply. Under the head of "General Remarks" may be noted what injury (if any) has been done to crops by storms, rust, insects, or other agencies; the supply of farm labour, rate of wages, etc. Make your report on 1st August, fill the blanks for township, county, name and post office address, and mail in the enclosed envelope. If unsealed it is postage free.

It is proposed in later Reports of the Bureau to verify the estimates of grain produce by the actual results of threshing, and you will confer a favour by sending me the name and address of one or more threshers operating in your township, through whom the required information may be obtained. The object is, to get the average of produce per acre.

Report on Crops and Live Stock for the Township of County of August 1, 1882.

1. Hay and Clover. 2 Fall Wheat and Spring Grains. 3. Corn, Beans, and Roots. 4. The Fruit Crop. 5. Pastures and Live Stock. 6. General Remarks.

CIRCULAR No. 8.—TO GRAIN THRESHERS.

Toronto, August 16th, 1882.

Your name has been furnished me as one likely to give to the Bureau of Industries information of the yield of Grain in your locality. The object is to verify estimates of produce already made, and as nearly as possible to ascertain the quantity of Wheat, Barley, Oats, Peas and Rye grown in the Province this year. The Bureau has already collected statistics of the acreage under each of those crops, and by obtaining actual results from Threshers, calculations can be made with safe averages.

You are asked to mark down on the card sent herewith the quantity of each kind of Grain threshed by you, together with the number of acres from which the crop has been grown,—taking the results as your work goes on, without selection of better or worse. Make a separate entry for each farm, fill in the blanks for Township, County, Post Office, and Name, and on the 25th of September mail in the enclosed envelope. If not sealed it will come postage free.

A copy of the Bureau's Report will be sent you as soon as it is published, which will be early in October.

[The kind of grain for which returns were asked were Fall Wheat, Spring Wheat, Barley, Oats, Peas and Rye.]

CIRCULAR No. 9.—TO CORRESPONDENTS.

TORONTO, August 21st, 1882.

The heavy rains and unsteady weather of this month have caused much anxiety as to the condition in which grain crops have been gathered. The Report of the Bureau for September should be full and accurate under this head, besides giving an account of the progress of harvesting operations. It is also important to know the quality of grain; the extent (if at all) to which it has been injured by rust, insects, or other causes; the average yield per acre as shown by results; and the progress made in threshing and marketing grain. If you have not already given me the name and post office address of one or more threshers operating in your Township, for the purpose of obtaining more accurate returns of the average yield, I will be obliged if you will do so with this Report; or, still better, send it by post card with first mail.

The condition of Corn, Beans and Buckwheat, of Fruit and Live Stock, and of Potatoes, Turnips and other Roots should also be carefully noted; and under the head of General Remarks reference may be made to preparations for sowing Fall Wheat, the Honey produce of the year, or any subject of special local interest.

The returns of correspondents should if possible be posted on the date for which they are made, viz., the 1st of September, as it is important that the information should be complete when the work of compiling the Report begins. Mail in the enclosed envelope; if not sealed it will come postage free.

Report on Crops and Live Stock for the Township of County of September 1st, 1882.

1. Name and Address of Threshers operating in the Township.
2. Progress of Harvesting operations—Condition in which Grain Crops have been gathered—Quality of the Grain—Threshing and marketing.
3. Average yield in Bushels of Fall Wheat, Spring Wheat, Barley, Oats, Peas, Rye.
4. Condition of Pastures and Live Stock—What are the prospects of Dairy Produce, and of the Beef, Mutton and Pork supply?
5. Condition of the second crop of Clover, and of the new crop—Prospect of the yield of Clover and Timothy seeds.
6. Condition of Corn, Beans and Buckwheat—Estimated average yield of each per acre?
7. Condition of Potatoes, Turnips and other Roots. How have they been affected by recent rains?
8. Condition of Fruit Trees and the Fruit Crop—Apples, Pears, Peaches, Grapes, etc.
9. General Remarks—Preparations for sowing Fall Wheat—Best varieties of Wheat—Honey Produce, etc.

CIRCULAR No. 10.—TO SCHOOL INSPECTORS.

TORONTO, September 6, 1882.

You will greatly oblige by filling up the blank sent herewith for the address of the Rural School Sections in your Inspection District, giving the number of each Section, the Township (or Townships, if a Union Section), and the Post Office; the address of corporate Village or Town Schools which do not embrace farm lands is not required. If there are any Separate Schools they should be distinguished by the initials "S.S."

It is proposed to send to each Teacher a copy of the October Report of the Bureau, which will comprise the full and revised Agricultural Statistics of the Province that the Teachers have assisted in collecting. The address list heretofore used is an old one, and I find that it contains numerous mistakes.

Mail the Return in the enclosed envelope; if not sealed it will come postage free.

CIRCULAR No. 11.—TO CORRESPONDENTS.

TORONTO, October 5th, 1882.

The last Monthly Report of the Bureau for this season will be issued about the 1st of November. It will contain tables of all agricultural statistics collected during the year, revised and corrected according to the latest data, a summary of the progress of Fall work, the condition of live stock, and other information of special interest to the farmers of Ontario.

You are invited to report for your township or district on the subjects outlined in the schedule below, and to mail the return in the enclosed envelope any time between the 20th and 25th inst.; if *not sealed it is postage free.* In some instances the returns of correspondents have not been received until the Report for the month was published, when of course they were too late to be of any use. *This shows the importance of mailing promptly.*

The variable character of the season has been well calculated to show the value of underdraining. A light fall of snow in Winter, Spring frosts and cold Spring rains, midsummer drouth, a heavy rainfall during harvest and a second season of drouth at the time of Fall seeding were a severe test to all inefficiently drained lands. A full report on this subject is desirable.

Returns are being received from threshers of the produce per acre of wheat, barley, oats, peas and rye, as found by actual results. Possibly these may not be complete for the whole Province, and you are asked therefore to report the average yield of those grains in your locality, as well as of other crops named in the schedule; also the average of Rent and Wages.

The other features of the return now asked for do not need specific reference ; their scope and object will be clearly understood. I shall, however, be glad to have correspondents who make a specialty of any department of agricultural industry report at length on matters relating to their particular interest.

It is due to the correspondents of the Bureau that I should acknowledge the intelligent part they have taken in its work. Their returns have been on the whole very complete and comprehensive, and many valuable practical suggestions have been received from them, both as to method and subjects of inquiry.

Report on Crops, Live Stock, etc., for the Township of , County of October 25th, 1882.

1. Average produce of Fall Wheat, Spring Wheat, Barley, Oats, Rye, Peas, Corn (in the ear), Beans, Buckwheat, Potatoes, Mangel Wurzel, Carrots and Turnips per acre—Average Rent of Farm Land, and average Wages of Farm Hands by the year, month and day, and of Domestic Servants by the week.

2. Acreage of Fall Wheat sown as compared with this year's crop—Condition of the ground at seeding time—Present appearance of the crop—Has any injury been done by the Hessian Fly?

3. Condition of Corn, Beans, Buckwheat and Seed Clover at harvesting—What damage (if any) by by Frost, Storms, or other cause?

4. Condition of Potatoes, Turnips and other Roots—Progress of taking up and securing for the Winter—Effect of the Rot on Potatoes.

5. Condition of Fruit Trees and cause of the failure of Fruit this year—Extent of Loss by Insect pests, Storms or Frost, especially by the gale of 14th September—Is the supply of Fruit sufficient for local consumption? Of what Fruits is there a surplus?

6. Condition of Fall Pastures and of Live Stock—Progress of Fattening Cattle, Sheep and Hogs, and prospect of supplies for market—The Butter and Cheese interest.

7. Effects of Spring Frosts and Rain upon this year's crops on drained and undrained lands—Delay of Seeding caused by lack of drainage—What progress has been made by farmers in underdraining, and what material is chiefly used? Give the Name and Post Office Address of Tile-makers in your district.

8. What attention is given to manuring the soil? To what extent are Plaster, Salt, Phosphates, or other fertilizers used, to what crops are they applied, and with what results?

9. General Remarks—Marketing of Wheat, Barley and other Grains—Progress of Ploughing for next Spring's Crops, etc.

CIRCULAR No. 12.—TO MANUFACTURERS.

Toronto, December 5, 1882.

In asking you to fill out and return the enclosed schedule, it is deemed advisable to give some explanation of the plans and objects of this division of the Bureau's work.

The Bureau itself, as you are doubtless aware, is attached to the Department of the Commissioner of Agriculture, and has been established to collect, tabulate and publish industrial information for public purposes.

It is the duty of the Commissioner, as prescribed by the Act, "to institute inquiries and collect useful facts relating to the agricultural, mechanical, and manufacturing interests of the Province, and to adopt measures for disseminating and publishing the same in such manner and form as he finds best adapted to promote improvement within the Province, and to encourage immigration from other countries."

The Reports issued from the Bureau from time to time this year have dealt almost exclusively with the agricultural interest of the Province during the growing and harvesting seasons, and a mass of facts relating to this great interest has been collected and published. The tables of statistics given in those Reports have been compiled mainly from schedules filled out by the farmers themselves. They show

the area of farm land occupied and cleared in each County of the Province, the acreage and produce of the season's crops, the numbers of each class of live stock, the values of real and personal property, the rates of rent and wages, etc.

The aim of this Circular is to procure for the Annual Report similar information respecting the manufactures of the Province. The form of schedule used for the Dominion Census has been followed, and it is proposed to show: (1) the kinds of industries carried on, (2) the number of establishments, (3) the amount of capital invested, (4) the value of raw materials used, (5) the value of products, (6) the number of persons employed, and (7) the amount of wages paid.

The plan adopted is the one found to work so satisfactorily in the collection of agricultural statistics, viz., the sending of a schedule to each manufacturer, to be filled by him for his own establishment. But instead of procuring tabulation for a town or district in the locality, as was done with the aid of school teachers in the case of farmers' schedules, and as is the practice in census-taking, it is intended to do the whole work of compiling tables here. The return of each manufacturer will consequently be known only to this Bureau, and it will be treated strictly as confidential information.

The tables of statistics will be compiled (1) by Counties, giving the number of industries in each, the amount of capital invested, the number of persons employed, etc., and (2) by Industries, giving the kind of each industry in the Province, the number of establishments, the amount of capital invested, etc. Individual returns will not be published; they will be given only in bulk with others of the same class.

It is scarcely necessary to add, that the information now sought for has nothing to do with any system of taxation, nor will it be available for any assessment purpose. Experience shows, however, that in the inception of every measure for collecting industrial statistics the fear of an ulterior object of this kind exists in some degree, and that acting under its influence some men either understate the facts of their own business or withhold them altogether. It is hoped that the returns of Ontario manufacturers will be full and accurate from the outset.

There are no facts of greater interest to the citizen than those relating to the growth of wealth and population. The results of the Census are carefully studied, for they are the measure of a people's progress or decline. But a Census is usually taken only once in ten years, and its lessons are often misleading. The time of taking it may be in the midst of a commercial depression, as in 1861; or immediately following a bad harvest, as in 1871. What false impressions the statistics of Canada for those years have made on the emigrating classes of the Old World, it is not difficult to conceive. And the worst of it is, that those impressions have never yet been wholly removed. We have suffered a whole decade from the fact that in 1870 the average production of spring and fall wheat in Ontario was only 10½ bushels per acre; whereas the statistics for this year show that the average was 23 bushels per acre, or, taking fall wheat alone, 26 bushels—being nearly 9 bushels per acre more than the fall wheat averages for Ohio, Michigan, Indiana, and Illinois. A knowledge of this fact alone cannot fail to be of great service to the interests of the Province, both at home and abroad.

Under a system which provides for the yearly collection of statistics we can ascertain the true averages of production, and the real growth of industries; and with such information to give to the world there is reason to hope that Ontario will not suffer for the reputation of unfortunate years. We need to show the enterprise and prosperity of the country, as well as its capabilities, if we would draw to it a larger share of foreign capital and foreign labour to aid in the development of its resources; and not less so, looking to the movement of populations and the attractions of other fields, if we would give heart and animation to our own people, and retain them as citizens of their native land. It is a matter for serious reflection that at the present time there are more than half a million Canadians settled in the United States.

The Schedule, as you will notice, calls for the statistics of this year. The Legislature having been summoned to meet on the 13th inst., it is desirable to have the returns made before the close of the year, so that the tables may be compiled for the Annual Report and presented to the House early in January. You can doubtless form an estimate for the balance of this month, and make the return complete for the year. The aim is not to collect returns of all the industries of the Province, with the minuteness of a Census, but rather such returns as may be classed generally under the head of Factory Industries.

The manufacturers of agricultural implements are asked, in addition to the regular return, to give a statement of the number of reaping and mowing machines (single and combined) and of seed drills made by them for this year's market; the object being to show the extent to which these labour-saving implements are used.

Trusting to receive from you an early and full return, etc.

P.S.—The return may be mailed in the enclosed envelope. *If not sealed it is postage free.*

List of Industries.

Agricultural Implement Works, Bent-stuff and Handle Factories, Biscuit Factories, Boot and Shoe Factories, Breweries and Malting Houses, Brick and Tile Yards, Broom and Brush Works, Button Factories, Cabinet and Furniture Shops, Carding and Fulling Mills, Carriage and Waggon Shops, Cigar and Tobacco Factories, Cotton Factories, Corset Factories, Distilleries, Edge Tool Works, Engine and Boiler Works, Foundry Works in Brass, Lead, etc.; Flour and Grist Mills, Foundries and Machine Works, Gas Works, Glass Works, Gypsum and Phosphate Mills, Hosiery Factories, Meat Curing and Packing Houses, Musical Instrument Factories, Nail and Rivet Works, Oil Refineries, Paper and Pulp

Mills, Pot and Pearl Asheries, Preserved Fruits and Meats Factories, Pump Factories, Railway Car Factories, Rolling Mills, Salt Works, Sash, Door and Blind Factories, Saw Mills, Scale Factories, Scutching Mills, Sewing Machine Factories, Shingle Factories, Ship Yards, Starch Factories, Tanneries, Trunk and Box Factories, Vinegar Factories, Woodenware Factories, Woollen Factories.

SCHEDULE OF MANUFACTURES FOR 1882.

1. Kind of industry carried on. 2. Name of place where located. 3. Name of proprietors or company. 4. Capital invested. 5. Average number of persons employed. 6. Total amount of yearly wages. 7. Total value of raw materials used this year. 8. Total value of products this year.

ADDITIONAL RETURN BY MANUFACTURERS OF AGRICULTURAL IMPLEMENTS AND OF DRAIN-TILE.

1. No. of single reapers made for this year's market. 2. No. of single mowers made for this year's market. 3. No. of combined machines made for this year's market. 4. No of seed drills made for this year's market. 5. Quantity of drain-tile made this year.

CIRCULAR No. 13.—TO REEVES AND DEPUTY REEVES OF MUNICIPALITIES.

TORONTO, December 6, 1882.

It is proposed to publish in the Annual Report of this Bureau statistics of the Cheese and Butter industry of the Province for the current year. If there are any Factories or Creameries in your Township I will be greatly obliged by your sending me (not later than the 15th inst.) the name of the Manager, Treasurer or Secretary of each, as per the annexed schedule. Creameries should be specified as such.

mailed in the enclosed envelope, and unsealed, the Return is postage free.

RETURN TO THE BUREAU OF INDUSTRIES.

Name and Address of Officers of Cheese Factories and Creameries in the Township of , 1882.

Name of Factory or Creamery ; Name of Manager or other officer ; Post Office Address.

CIRCULAR No. 14.—TO CHEESE MANUFACTURERS.

TORONTO, 13th December, 1882.

I am anxious to publish in the Annual Report of this Bureau complete statistics of the Cheese Industry of Ontario for the current year, giving—(1) Number of Factories in operation, (2) Quantity of Milk used, (3) Quantity of Cheese made. (4) Value of Cheese sold, (5) Quantity of Cheese on hand. It would be interesting also to know the number of Patrons of Factories, and the number of Cows whose milk has been supplied.

The returns will be published by Counties, and it is therefore desirable that persons having a number of Factories under their management should, if practicable, make a separate return for each County.

The statistics will be prepared for publication in bulk form only, and the return for any one Factory will in no case be given without permission to so use it. The information supplied to the Bureau will, of course, be treated as confidential.

As the Report must be ready for presentation to the Legislature early in January, it is important that all returns should be received not later than 30th December inst.

RETURN OF CHEESE PRODUCE FOR 1882.

1. No. of Factories for which Report is made. 2. In what Township and County located. 3. Quantity of Milk used, lbs. 4. Quantity of Cheese made, lbs. 5. Value of Cheese sold. 6. Quantity of Cheese on hand. 7. Number of Patrons. 8. Number of Cows whose milk has been supplied.

CIRCULAR No. 15.—TO BUTTER MANUFACTURERS.

Toronto, 20th December, 1882.

I am anxious to publish in the Annual Report of this Bureau complete statistics of the Cheese and Butter Industries of Ontario, the produce of Factories and Creameries. For this purpose you are invited to fill up the accompanying schedule, and to return the same in the enclosed envelope.

The statistics will be prepared for publication in bulk form only, and the return for any one Creamery will in no case be given without permission to so use it. The information supplied to the Bureau will, of course, be treated as confidential.

As the Report must be ready for presentation to the Legislature early in January, it is important that all returns should be received not later than 30th December inst.

Return of Creamery Butter for 1882.

1. In what Township and County is Creamery located? 2. Quantity of Cream used. 3. Quantity of Butter made. 4. Value of Butter sold. 5. Quantity of Butter on hand. 6. Number of Patrons. 7. Number of Cows whose milk or cream has been supplied. 8. What system is adopted with Patrons? Do you collect Milk or Cream?

APPENDIX TO REPORT

OF THE

Commissioner of Agriculture and Arts.

APPENDIX (G).

ANNUAL REPORT OF POULTRY ASSOCIATION OF ONTARIO.

ANNUAL REPORT

OF THE

POULTRY ASSOCIATION OF ONTARIO

FOR THE YEAR 1882.

To the Honourable the Commissioner of Agriculture, Toronto:

Sir,—I have the honour to submit herewith the Annual Report of the Poultry Association of Ontario for the year 1882.

Herewith I also append a list of the Officers of this Association for the ensuing year, who were elected at the Annual Meeting at Brantford, on the 14th February, 1882. It was also decided at the same meeting to hold the next Exhibition of the Association in Toronto.

Your obedient servant,

W. Sanderson, *Secretary.*

Brantford, *March 9th, 1882.*

LIST OF OFFICERS

Elected for the ensuing year at the Annual Meeting of this Association, held at Brantford, on the 14th February, 1882:—

President—W. H. Doel, Doncaster.

First Vice-President—A. Bogue, London.

Second Vice-President—E. Kester, Brantford.

Directors—S. Butterfield, Sandwich; J. W. Buck, Brantford; P. Spragge, Guelph; J. Saulter, Peterboro'; J. Eastwood, Hamilton; U. Boddy, Toronto; C. Bonwick, Yorkville; L. Thorne, Blythe; J. Main, Boyne.

Secretary—W. Sanderson, Stratford.

Treasurer—J. James, Toronto.

Auditors—W. H. Hill, Toronto; J. O. Weldon, London.

E. Kester, *President.*

W. Sanderson, *Secretary.*

Brantford, *March 9th, 1882.*

ANNUAL REPORT OF THE POULTRY ASSOCIATION OF ONTARIO.

The Annual Exhibition of this Association was held in the Kerby Hall, Brantford, on the 9th to 15th February, 1882, and was a very great success; both the number and quality of the exhibits being very largely in advance of all previous exhibitions. The total number of entries being 1,192.

The *Asiatic* classes, comprising *Brahmas*, *Cochins* and *Langshans* were in great number, and the competition in the different breeds was very close. The Light Brahmas were especially fine and in splendid condition.

The *Games* were very largely represented in all the various breeds, and competition very keen—many very fine birds being left out of the prize list. Several good judges remarked that they never saw such a splendid lot of Games together at any exhibition.

The *Hamburgs* were as usual in good display, and were especially fine, yet many very fine birds were in poor health; this breed being rather tender for our severe climate in winter.

The *Leghorns* were in considerable advance on last year's exhibition, and some very fine stock was shown, both in the White and in the Brown varieties.

The *Spanish* class was better than last year, but was about the poorest in this exhibition—very few really good birds being shown.

The *Plymouth Rocks* were not in so great numbers as previous shows, but they were probably finer than at any former show. This breed is steadily advancing in public favour, and now takes the lead as a farmer's fowl, with whom they are favourites.

The *Polish* class was very large and fine; the White Crested Black being largely shown, and in splendid condition. All the other varieties of these useful birds being fully in advance of previous years.

In the *French* classes, the *Houdan* seems to be the only popular breed—many fine birds being shown. There were some very fine *Crevecœurs* and *La Fleche*, but neither of these latter breeds seem to hold their own in this country.

The *Dorking* class was not very large, but the quality of the exhibits was very fine, both in silver grey and coloured—both of which were better than the white variety.

Bantams were very largely shown, and contained some splendid specimens. The Game varieties being largely shown of splendid quality.

In *Turkeys*, the Bronze variety took the lead, both in size and numbers, as well as in quality—some splendid specimens being on exhibition. Some very fine wild turkeys were also shown.

In *Ducks*, the numbers were not as great as usual, but the *Aylesburys* and *Rouens* were very fine. Good *Pekins* and *Cayugas* were also exhibited.

In *Geese*, the same remarks apply. The *Toulouse* and *Bremen* were very fine, and would be hard to beat.

In *Pigeons*, the show was very good—some splendid birds being shown.

There were also some few pairs of *Pheasants* on exhibition—a pair of Goldens being one of the chief attractions of the exhibition. An artificial mother containing young chicks was also shown.

The exhibition was on the whole one of the best ever held, and a very large number of birds changed hands at good prices. It was estimated by the *Poultry Review* that the value of birds sold amounted to about $4,000, which amount is not an over estimate of the sales made.

Although the exhibition was so very good, and every inducement held out, yet the public did not patronize it as they ought.

All of which is respectfully submitted.

E. Kester, *President.*

W. Sanderson, *Secretary.*

Brantford, *February 14th, 1882.*

POULTRY ASSOCIATION OF ONTARIO.

Financial Statement for Year 1882.

F. J. Grenny, Treasurer, in account with the Poultry Association of Ontario.

Dr.

To Memberships		$79 00	
" Entry fees		504 10	
" Coops sold		8 00	
" Sales poultry		25 00	
" Door money		95 25	
" Government grant		700 00	
Balance due Treasurer		9 69	
			$1421 04

Cr.

By Balance from last year		1 46	
" Entry fees refunded		1 50	
" Expenses—Judges	$27 80		
" " General	266 65		
" " Secretary's salary	100 00		
		394 45	
" Furnishings, coops, etc.		10 25	
" Printing and advertising		77 53	
" Paid poultry sold		25 00	
" " note		50 00	
" Prizes		860 85	
			$1421 04

The above statement has been duly audited and found correct.

E. Kester, *President.*
W. Sanderson, *Secretary.*

Dated Brantford, November 25th, 1882.

Supplementary Statement.

Dr.

To old coops sold and not paid	$4 50	
" Balance	353 34	
		$357 84

Cr.

By Balance due Treasurer	$9 69	
" Balance of Prizes unpaid	348 15	
		$357 84

Audited and found correct.

E. Kester, *President.*
W. Sanderson, *Secretary*

Brantford, November 25th, 1882.

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